

THE SCALP

* Definition :-

- The soft tissue covering the vault of the skull (cranial vault).

* Extent :-

- Anterior :- supra-orbital margin (skin of eye brow).
- Laterally (sides) :- superior temporal line.
- Posterior :- superior ^{highest} nuchal line & external occipital protuberance.

* Layers of scalp :-

① Skin :-

- Thick & hairy with abundance of sebaceous glands
- has a rich blood supply.
- adherent to underlying aponeurosis (3rd layers) by a C.T (2nd layer).

② - Connective tissue :-

- Is dense fibrofatty tissue with dense septa from skin to the underlying aponeurosis
- has numerous vessels & nerves of scalp.

③ Aponeurosis :-

- It is called epicranial aponeurosis • (thin tendinous sheet).
- uniting the occipital & frontal bellies of occipito frontalis muscle.
- laterally attached to temporal fascia
- Under it there is a subaponeurotic space
- It is freely mobile on pericranium. due to loose areolar tissue under it. (the 1st 3 layers move together).

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(4) Loose areolar tissue :-

- occupies the subaponeurotic space (from eyelids to sup. nuchal line)
- contains few small arteries, emissary veins

[emissary veins are :- Valueless veins, connect superficial veins of scalp with diploic veins of skull bones & intracranial venous sinuses, it gives passage for infection → dangerous area.]

(5) Pericranium

- It is the Periosteum covering skull bones (dense c.T.)
- It is attached loosely to surface of the bones & firmly to sutures of skull, (so fluid as blood under it takes shape of bone)

Applied anatomy :-

(1) Skin :- • common site for sebaceous cysts & seborrhoea.

- avulsed parts are preserved because of good blood supply.

(2) C.T :- • wound of scalp bleed profusely because torn vessels are prevented from retracting by fibrous septa (fascia).

- Subcutaneous haemorrhages are never extensive (thick c.T.)
- inflammation causes little swelling but very painful.

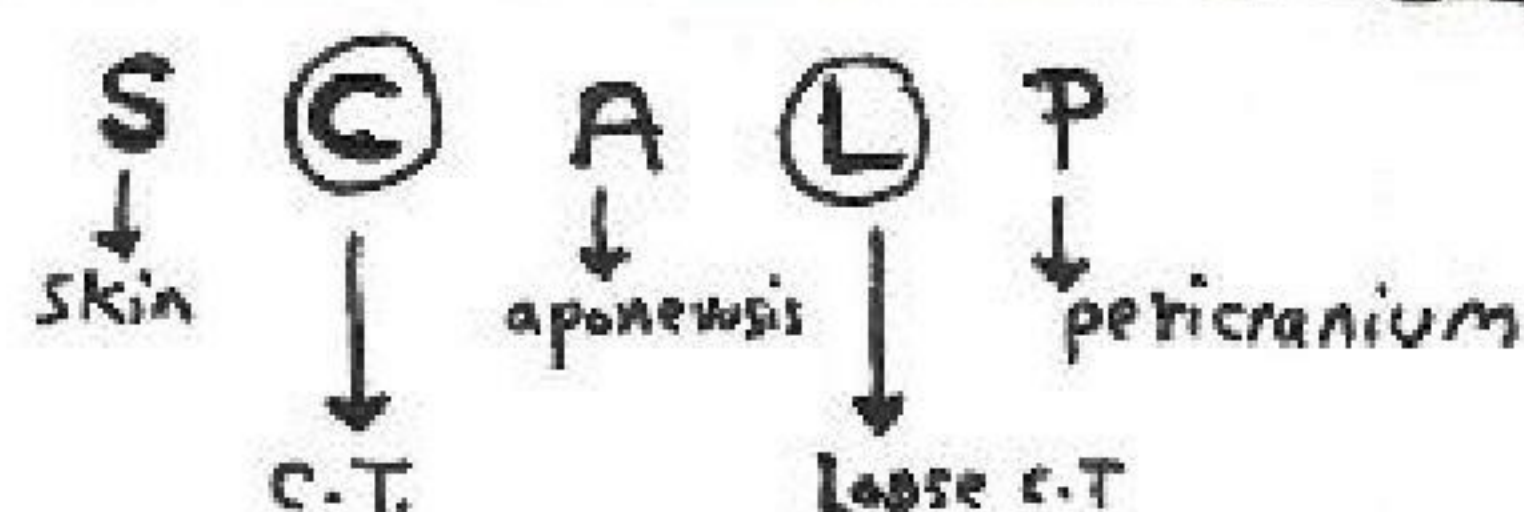
(3) Aponeurosis :- • transverse wounds of scalp gap if cut aponeurosis.

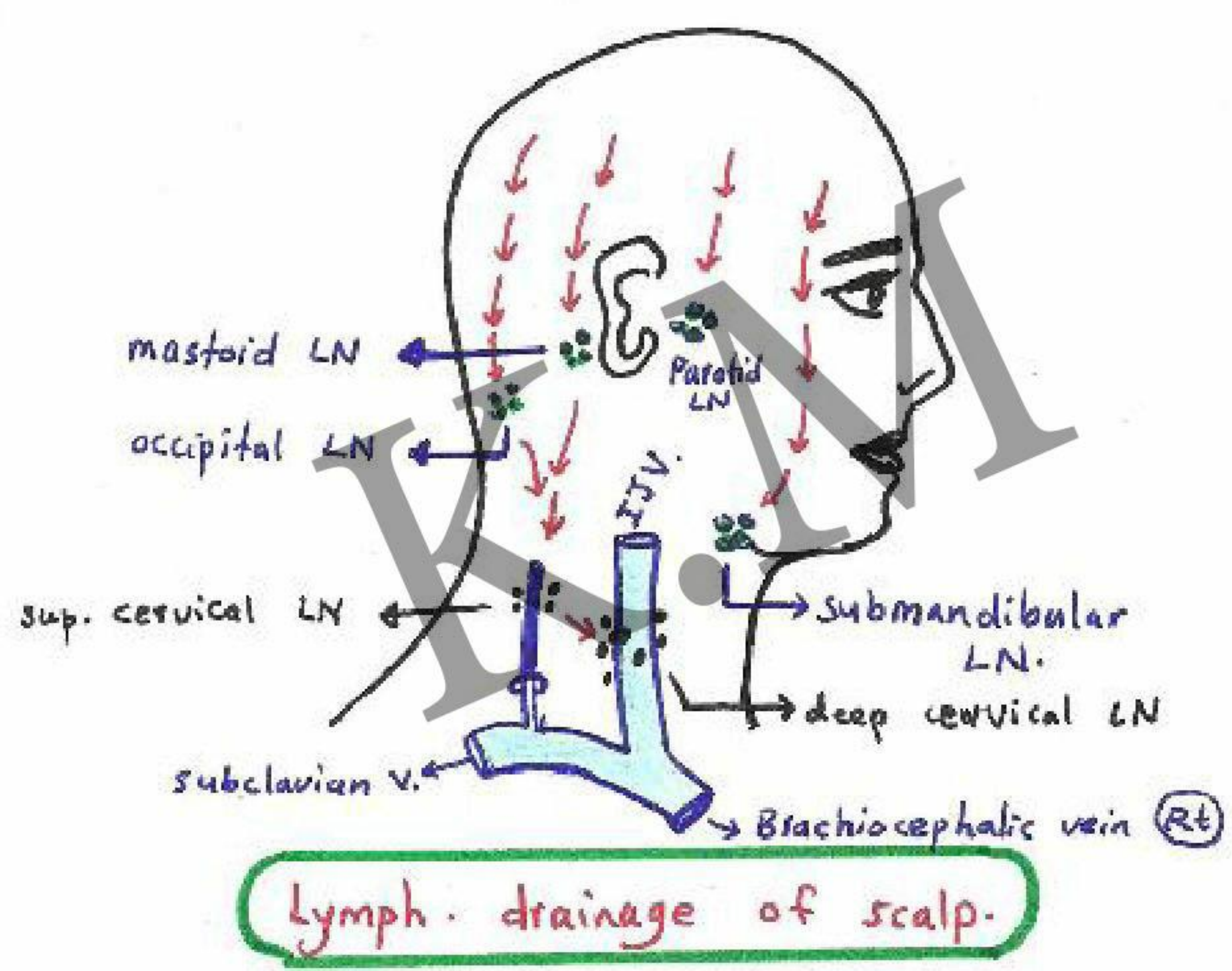
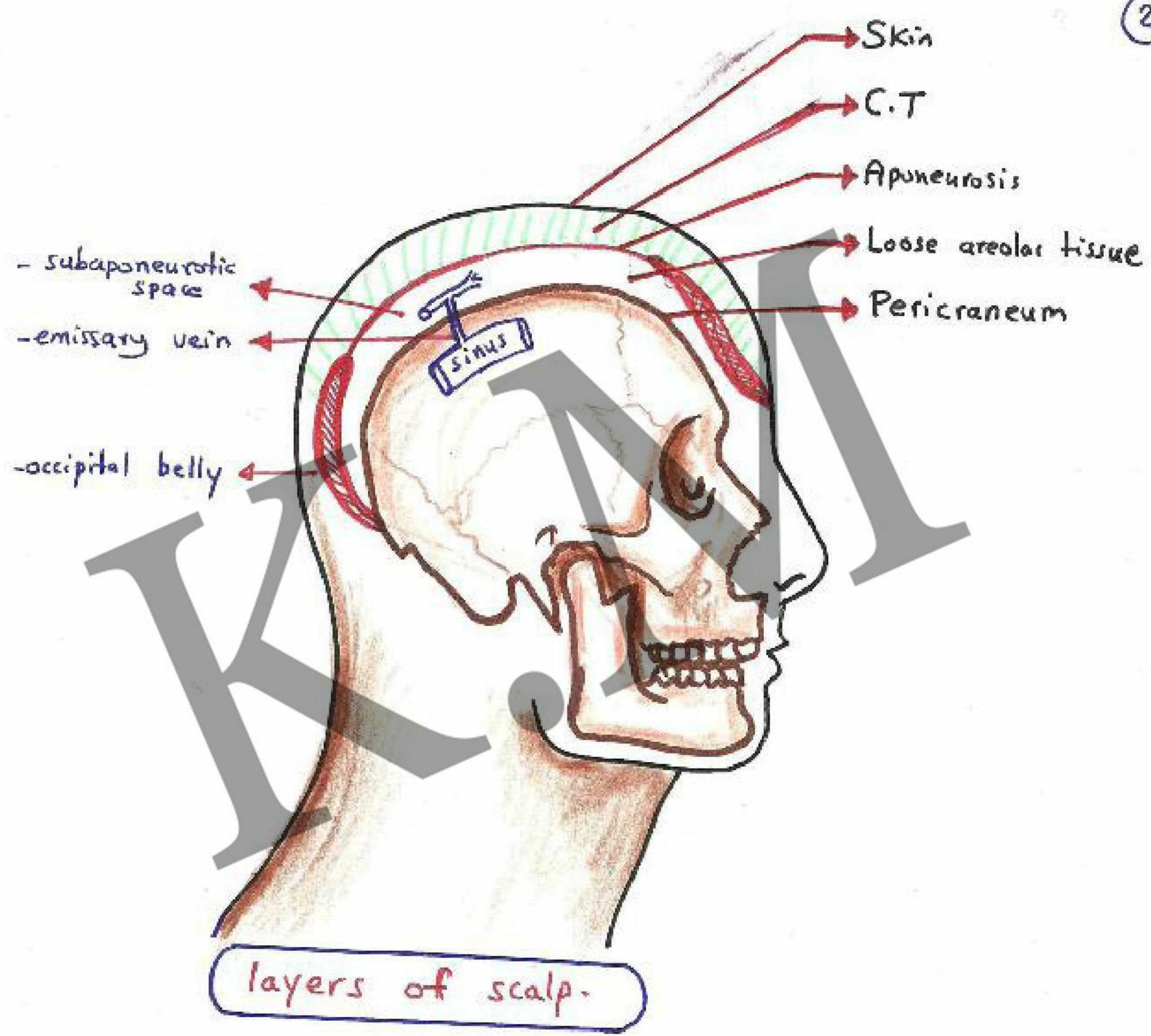
- incisions in the scalp should be longitudinal (to avoid gaping)

(4) Loose c.T. :- • dangerous area of the scalp → infection of scalp spread by emissary veins to venous sinuses.

- Black eye → blood from injured scalp enters the eyelids & nose (as frontalis inserted into skin not bone)

(5) Pericranium :- • blood under it takes the shape of bone.





Occipito-frontalis muscle :-

- Formed of 4 bellies (2 frontal → large & fused, and 2 occipital → small & separated) connected by epicranial aponeurosis.

* **Origin :-** Frontal belly :- skin & superficial fascia of eyebrow.

- Occipital belly :- highest nuchal line on occipital bone.

* **Insertion :-** into aponeurosis.

* **Nerve supply :-** Frontal belly :- Temporal branch of facial nerve (CN VII)

- Occipital belly :- Posterior auricular branch of facial nerve

* **Action :-** moves the 3 layers of the scalp forward & backward.

- frontal bellies raise the eyebrows in surprise or horror and makes transverse wrinkles in forehead.

Arterial supply of scalp

- | | | |
|--|--|-----------------------|
| ① Supratrochlear | } from ophthalmic branch of the internal carotid | } In front of auricle |
| ② Supra-orbital | | |
| ③ superficial temporal :- branch of external carotid | } behind auricle | |
| ④ Posterior auricular :- branch of external carotid | | |
| ⑤ Occipital artery :- branch of external carotid | | |

① **Supratrochlear & supraorbital arteries :-** ascend over forehead in accompany with supratrochlear & supraorbital nerves.

② **superficial temporal artery :-** is a smaller terminal br. of external carotid, ascend in front of auricle with auriculotemporal nerve
- divides into ant. & post. branches supplying skin over frontal and temporal regions.

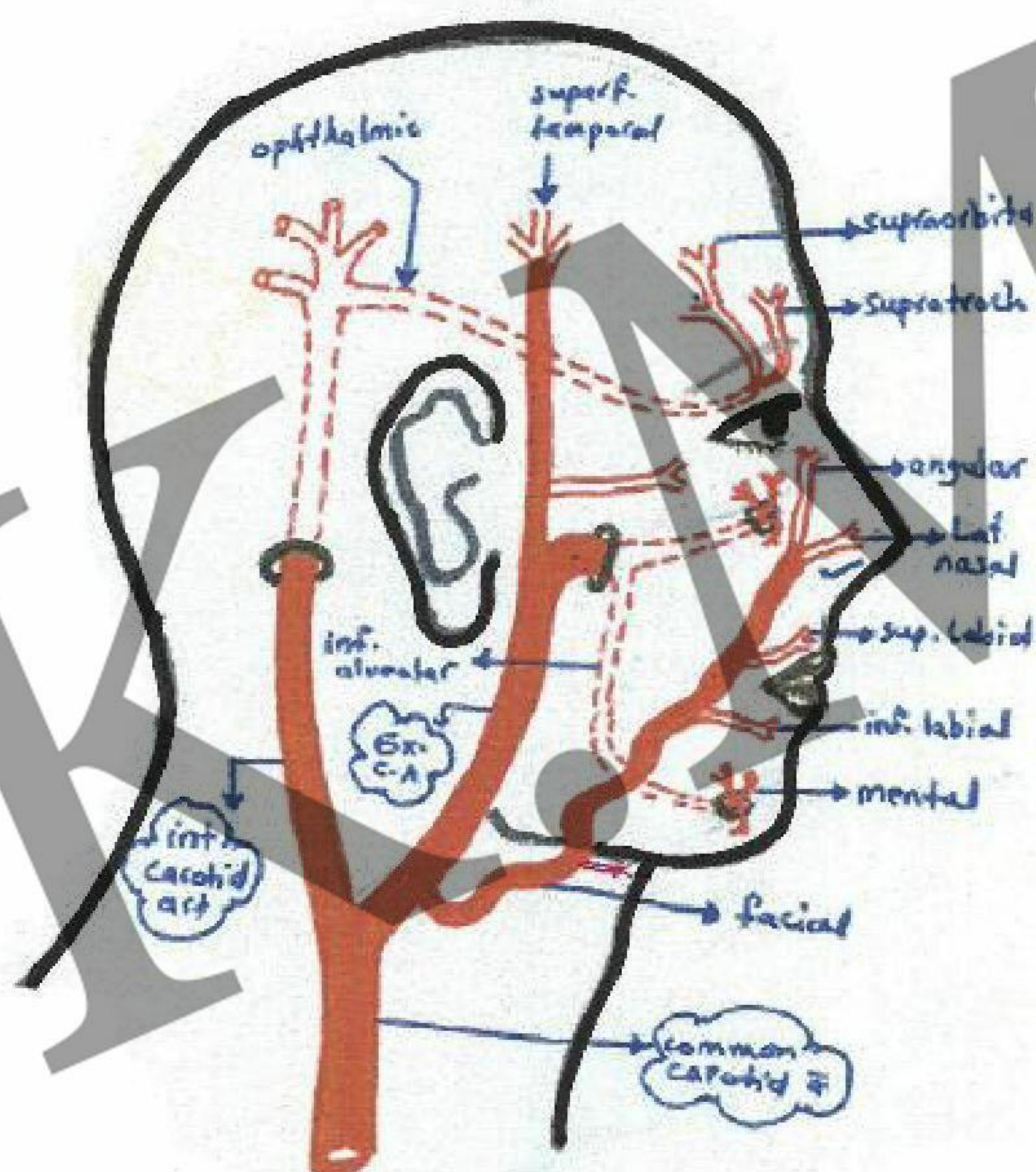
③ **Posterior auricular artery :-** br. of external carotid, ascend behind auricle, supply scalp above & behind auricle.

④ **Occipital artery :-** br. of external carotid, ascend from apex of post. triangle of neck with great occipital nerve
- supply scalp over back as high as vertex of skull.

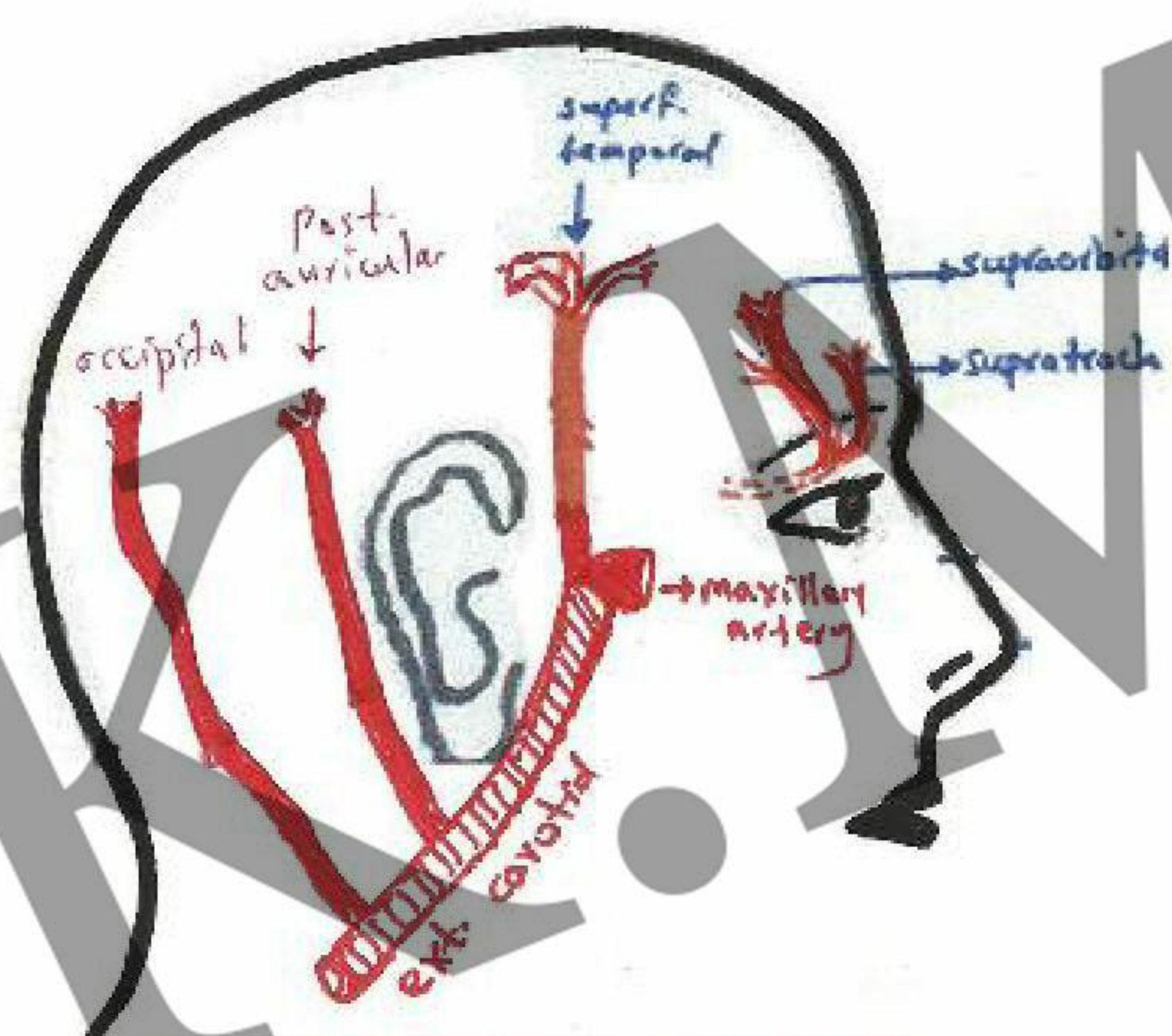
Lymph drain :- ant. part of scalp → preauricular (Parotid) LN & submandibular LN

- Post. part → Posterior auricular (mastoid) & occipital LN.

• from mastoid & occipital LN → to superficial cervical LN (along ext. Jugular vein) → to deep cervical LN (along IJV)



Arteries of face



Arteries of scalp.

Venous drainage of scalp

- ① Supratrochlear vein
- ② Supraorbital vein } unite forming facial vein (or ant. facial vein).
- ③ superficial temporal vein :- joins maxillary vein forming retro-mandibular vein (or post. facial vein).
- ④ Posterior ~~auricular~~ vein :- joins post. division of retro-mandibular V. to form external jugular vein
[ant. division joins facial V. to form common facial V.]
- ⑤ Occipital vein :- drains into suboccipital venous plexus (which drains into vertebral veins) or into internal jugular vein.
connected to sup. sagittal sinus by emissary V. through parietal foramen
" " sigmoid " " " " " " " " mastoid "

Nerve supply of scalp

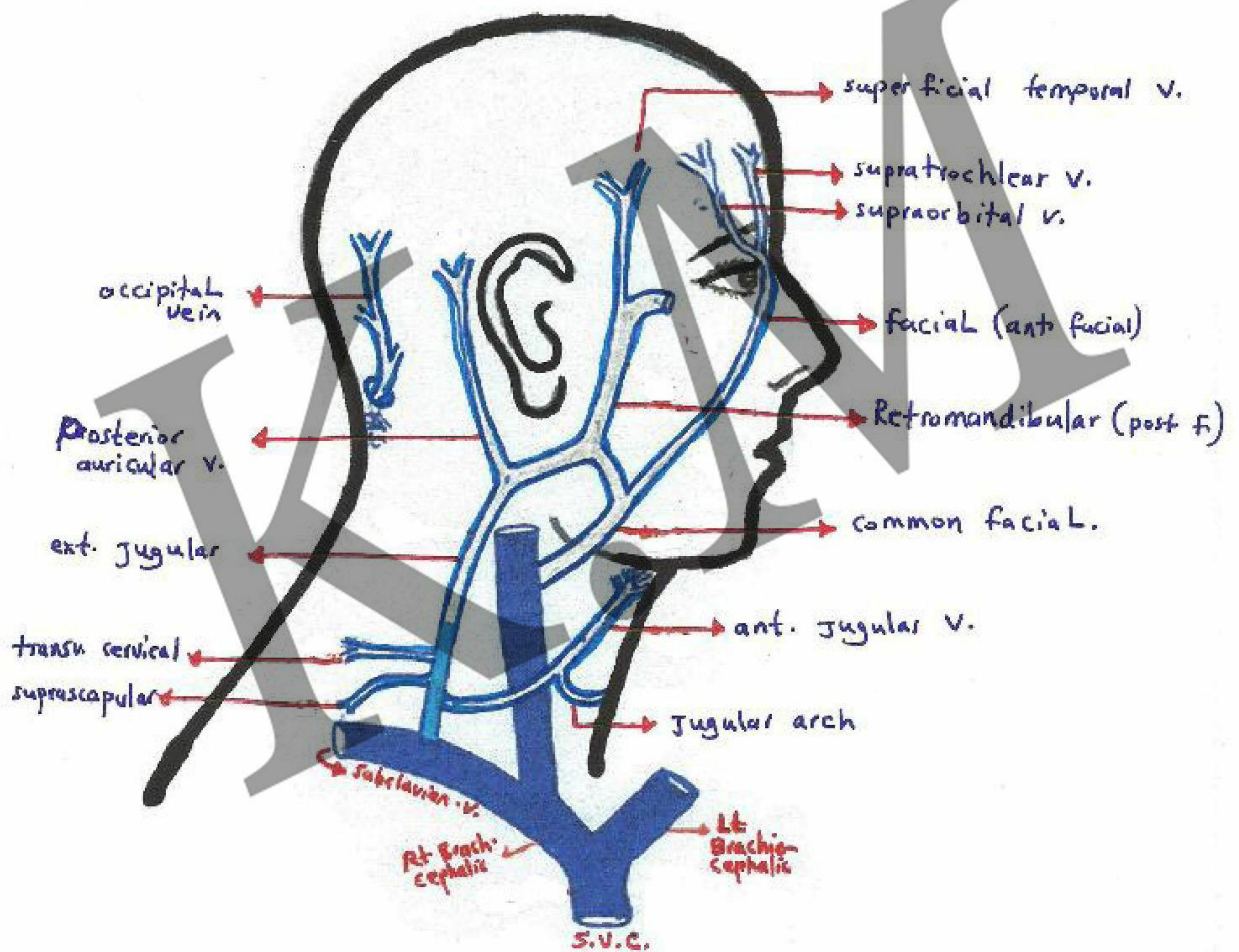
- ① Supratrochlear N. — br. of ophthalmic division of trigeminal nerve.
 - ② Supraorbital N. — " " " " " " " " " " " "
 - ③ Zygomatico-temporal; br. of maxillary " " " " " "
 - ④ Auriculo-temporal N.; br. of mandibular " " " " " "
 - ⑤ Temporal branch of facial nerve → motor to frontal belly
 - ⑥ Post. auricular; br. of " " " → motor to occipital " " " "
 - ⑦ lesser occipital N. br. of cervical plexus (C_2).
 - ⑧ Greater occipital N. br. of post. ramus of (C_2).
 - ⑨ third occipital N. br " " " " " (C_3).
 - ⑩ Great auricular N. br. of cervical plexus (C_2, C_3),
- In front of the auricle
- behind auricle

- Supratrochlear N. → winds around sup. orbital margin, supplies scalp as far as vertex.
- Supraorbital N. → " " " " " " " " " "
 . supratrochlear is medial to supraorbital.
- Zygomaticotemporal → supplies scalp over temple.
- Auriculotemporal → ascend in front of auricle, supplies skin over temporal region
- Greater occipital N. → ascend over back of scalp, supplies skin as far as vertex
 - the thickest cutaneous N. in the body.
- lesser occipital N. → supplies skin over occipital region & medial side of auricle
- third occipital N. → supplies skin over ext. occipital protuberance & back of neck.

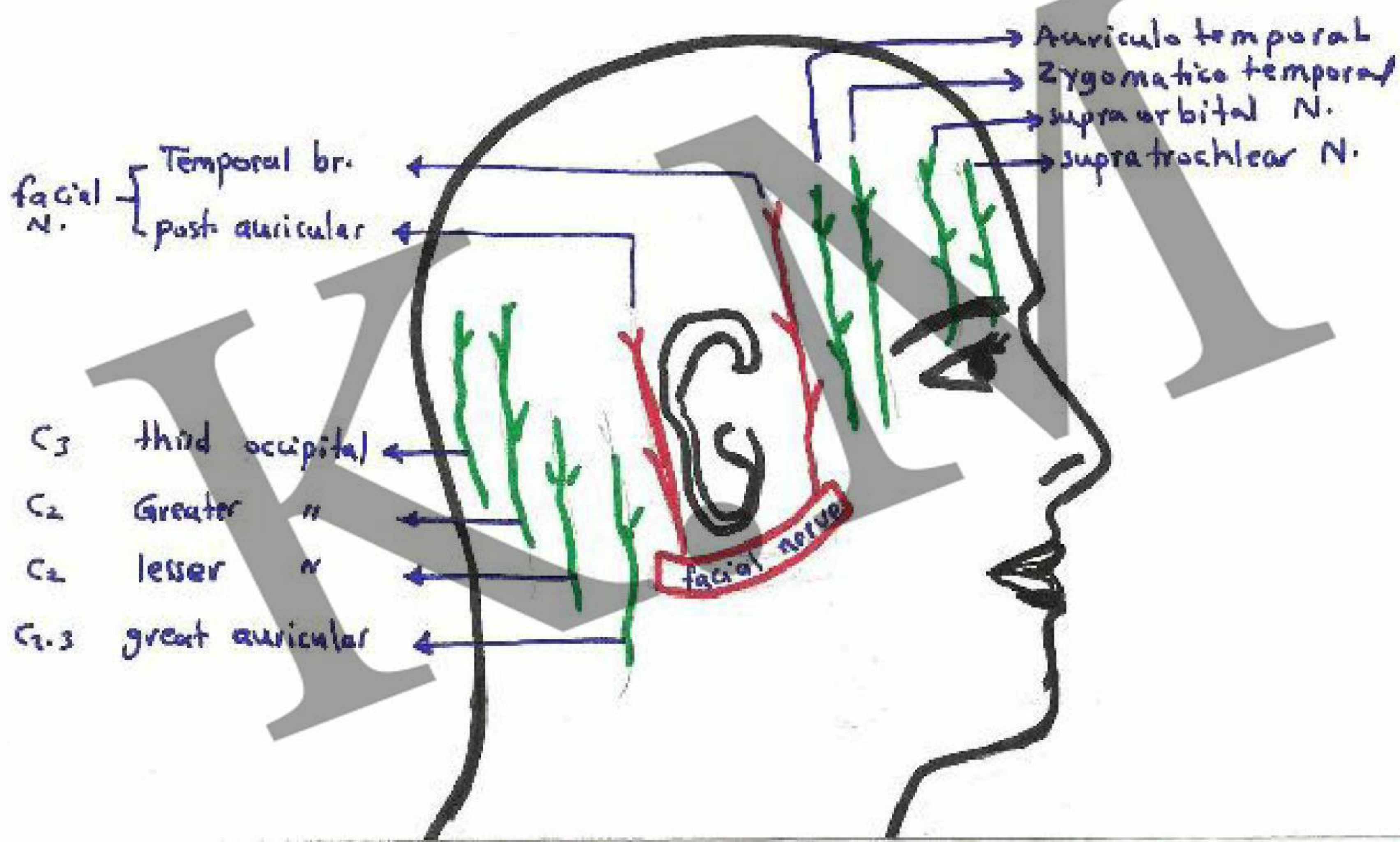
NB All above mentioned nerves are sensory

Veins of scalp & face

④



Nerves of scalp



THE FACE

- The face extends from hair line (or eyebrow) above, auricle on each side to chin & base of mandible below
- SKIN :-
 - rich in blood supply (wounds bleed profusely & heal rapidly)
 - rich in sweat & sebaceous glands
 - Lax (rapid spread of oedema) & fixed to underlying cartilage (boils of nose & ear are painful).
- SUPERFICIAL FASCIA :- contains muscles, vessels, nerves & fat.
- DEEP FASCIA :- absent EXCEPT over parotid gland (parotid fascia) & over buccinator (buccopharyngeal fascia).

Sensory nerves of face :

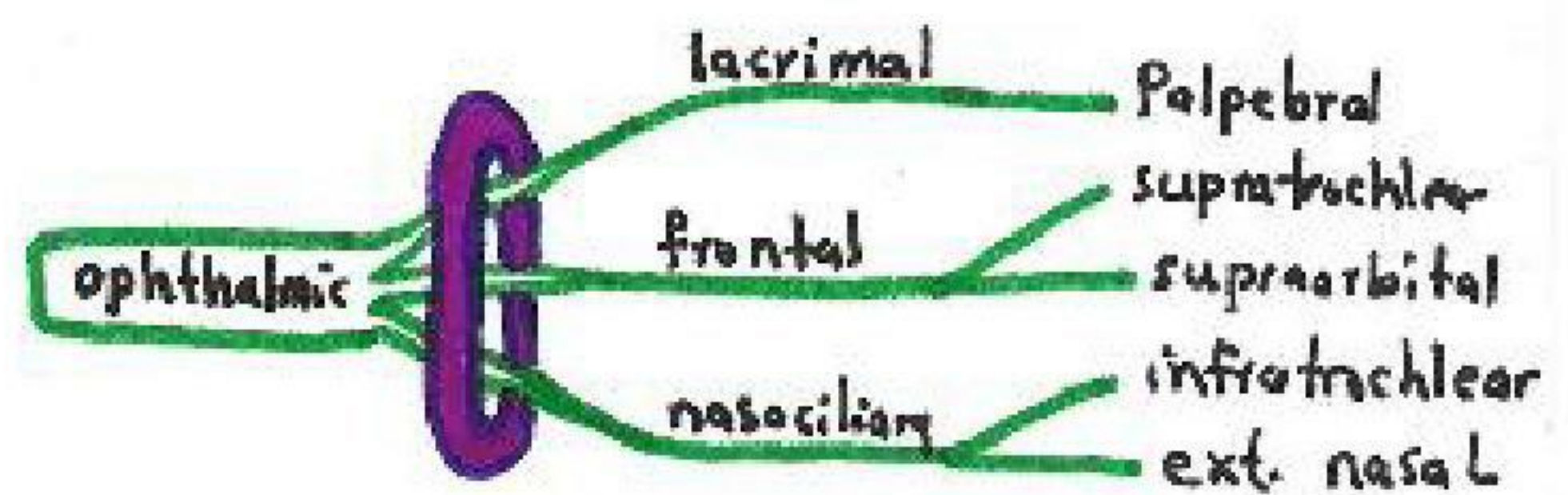
- Skin of the face is supplied by branches of trigeminal nerve (ophthalmic, maxillary & mandibular) EXCEPT ^{small area} over angle of the mandible & parotid gland which is supplied by great auricular N. (C₂₋₃)
- ① OPHTHALMIC NERVE :- supply region ^{developed from} frontonasal process
- ② MAXILLARY N. :- supply region developed from maxillary process of the 1st pharyngeal arch.
- ③ MANDIBULAR N. :- supply region developed from mandibular process of 1st pharyngeal arch.

NB :- trigeminal nerve supply ① skin of face ② proprioceptive to muscle of expression ③ sensory to mouth, teeth, nasal cavities & paranasal sinuses.

- ophthalmic N. :- supply skin of forehead, upper eyelid, conjunctiva and side of nose up to tip of nose.
- maxillary N. :- upper lip, cheek, side of nose (post. part) & lateral side of orbital opening.
- mandibular N. :- lower lip, lower part of face, part of auricle and temporal region.

* Branches of ophthalmic N. Pass to skin :-

- ① Palpebral (br. of lacrimal nerve).
- ② Supratrochlear (br. of ^{medial} frontal n.).
- ③ Supraorbital (br. of ^{lateral} frontal n.).
- ④ Infratrochlear (br. of nasociliary n.).
- ⑤ External nasal (br. of nasociliary n.).



- palpebral supplies skin & conjunctiva of lateral part of upper eyelid.
- Supratrochlear supplies skin & conjunctiva on medial part of upper eyelid & skin over lower part of forehead close to median plane.
 - winds around upper margin of orbit medial to supraorbital nerve.
- Supraorbital supplies skin & conjunctiva on central part of upper eyelid & skin of forehead, winds around upper margin of orbit at supraorbital notch.
- infratrochlear - supplies skin & conjunctiva on medial part of upper eyelid & adjoining part of side of nose, it leaves orbit below pulley of superior oblique muscle.
- External nasal n. supplies skin on side of nose as far as tip.
 - leaves nose by emerging between nasal bone & nasal cartilage.

* Branches of Maxillary N. Pass to skin :-

- ① Infraorbital :- direct continuation of maxillary n., emerge through infraorbital ^{foramen} ↑
 - supply skin of lower eyelid & cheek (palpebral), upper lip (labial) and side of nose (nasal)
- ② Zygomaticofacial :- pass through zygomaticofacial foramen, supplies skin over prominence of the cheek.
- ③ Zygomaticotemporal :- pass throug. Zygomaticotemporal foramen, supplies skin ^{over} temple

* Branches of mandibular N. Pass to skin :-

- ① Auriculo temporal - ascends from upper border of parotid gland (between ^{auricle & sup. temp vessel})
 - supplies skin of auricle, ext auditory meatus, outer surface of tympanic membrane & skin of scalp above auricle, temporomand. joint.
- ② Buccal nerve :- emerge from ^{anterior} border of masseter muscle, su
 - supplies small area of cheek.
- ③ Mental nerve :- emerge from mental foramen.
 - supplies skin of lower lip & chin.

Motor nerve of face :

- Muscles of facial expression are supplied by facial nerve (supply muscles of 2nd branchial arch)
- Muscles of mastication are supplied by mandibular ^{branch} division of trigeminal nerve (derived from 1st branchial arch).

* Facial nerve :-

- It is the 7th cranial nerve & give 7 motor br. to ms of face & scalp.
- Gives othe 3 branches intracranial (sensory)

* Extracranial course:-

- leaves skull through stylomastoid foramen, curves around styloid process then pierces posteromedial surface of parotid gland.
- ends inside parotid by dividing into 5 terminal branches.

* Branches of facial N. :-

(A) Before entering the parotid gland (after emerging the stylomastoid f.)

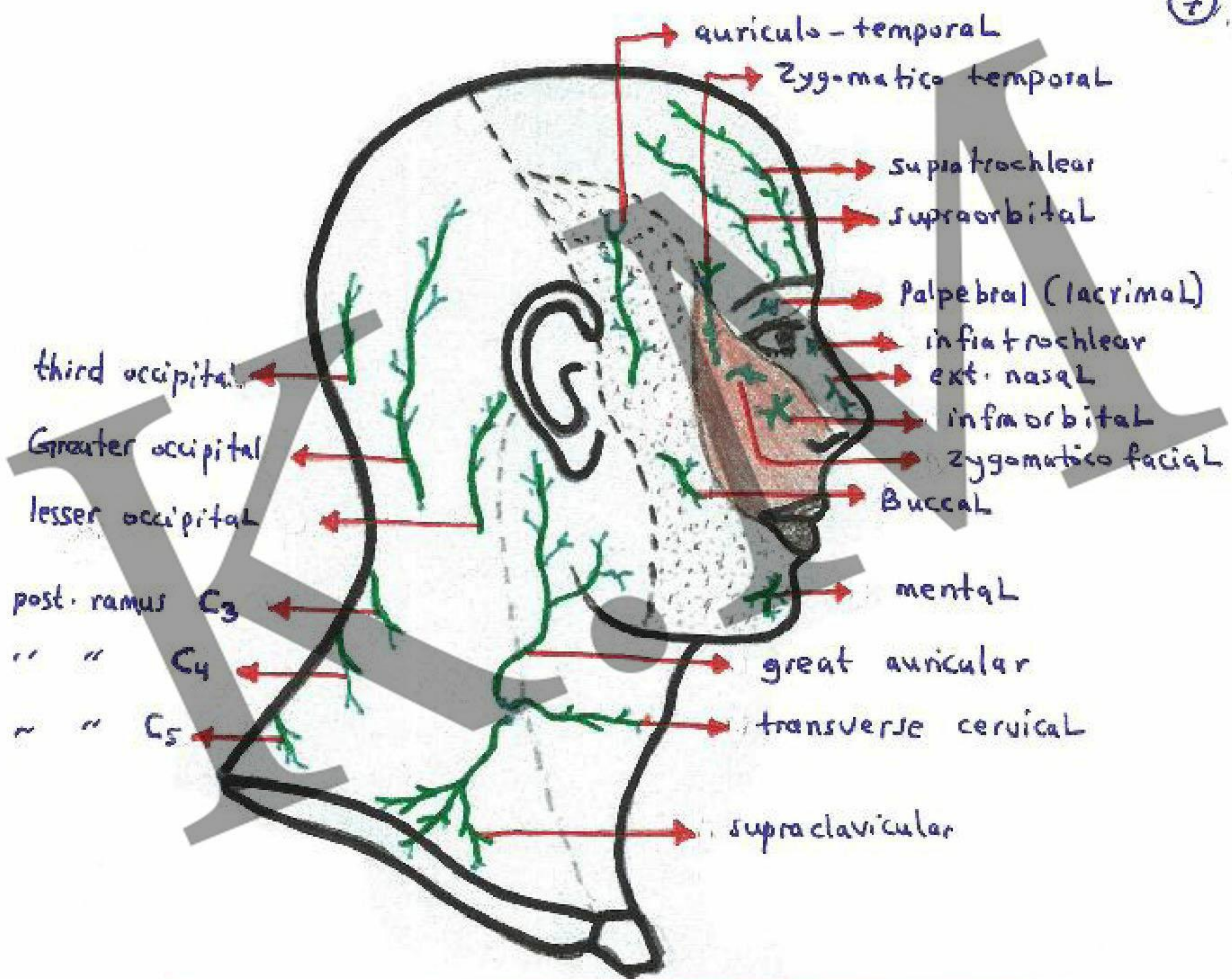
1. Posterior auricular N:- supplies occipital belly of occipitofrontalis + auricularis ^{posterior}
2. N. to stylohyoid:- supplies stylohyoid + post. belly of digastric

(B) Inside parotid (terminal br.):-

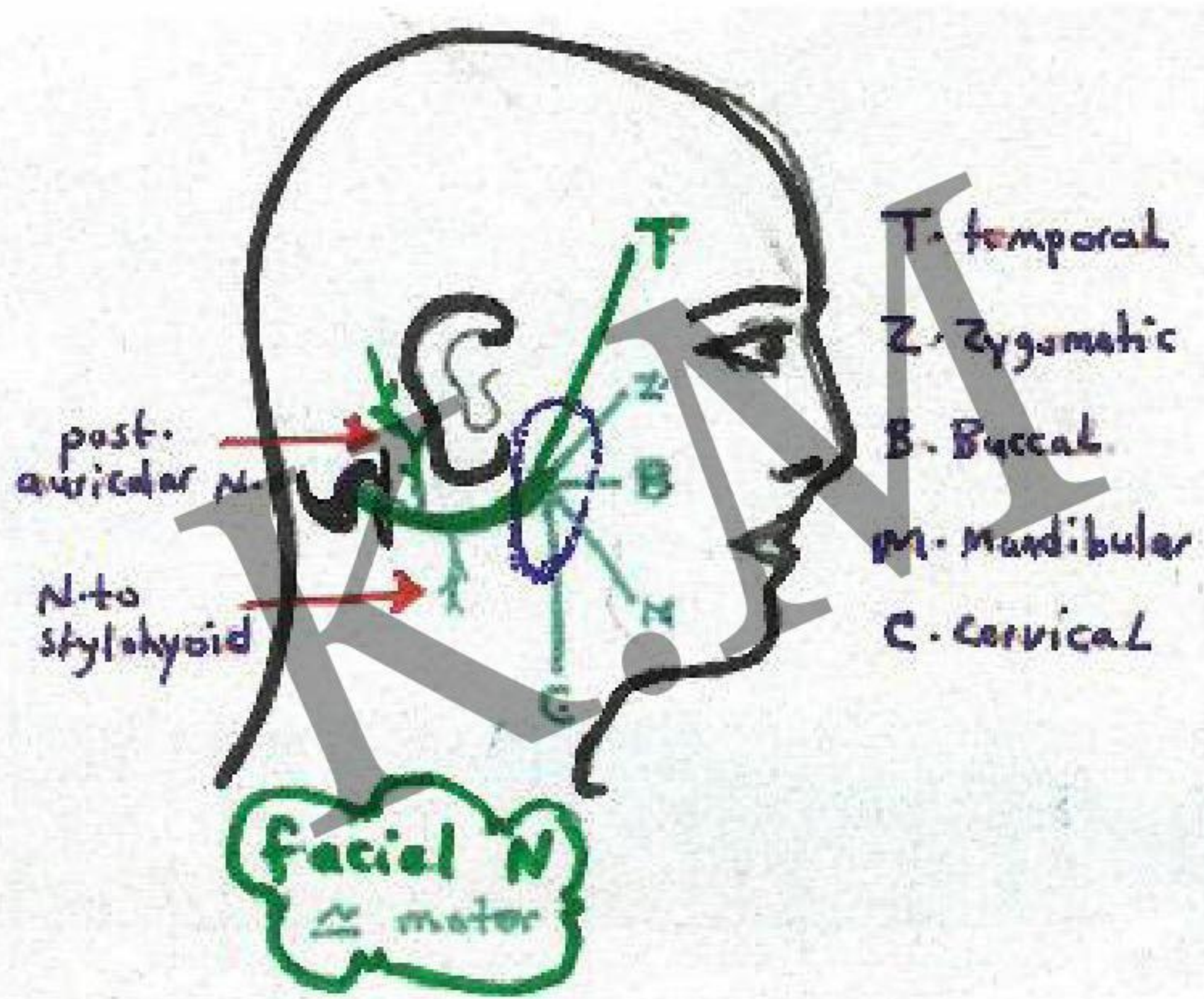
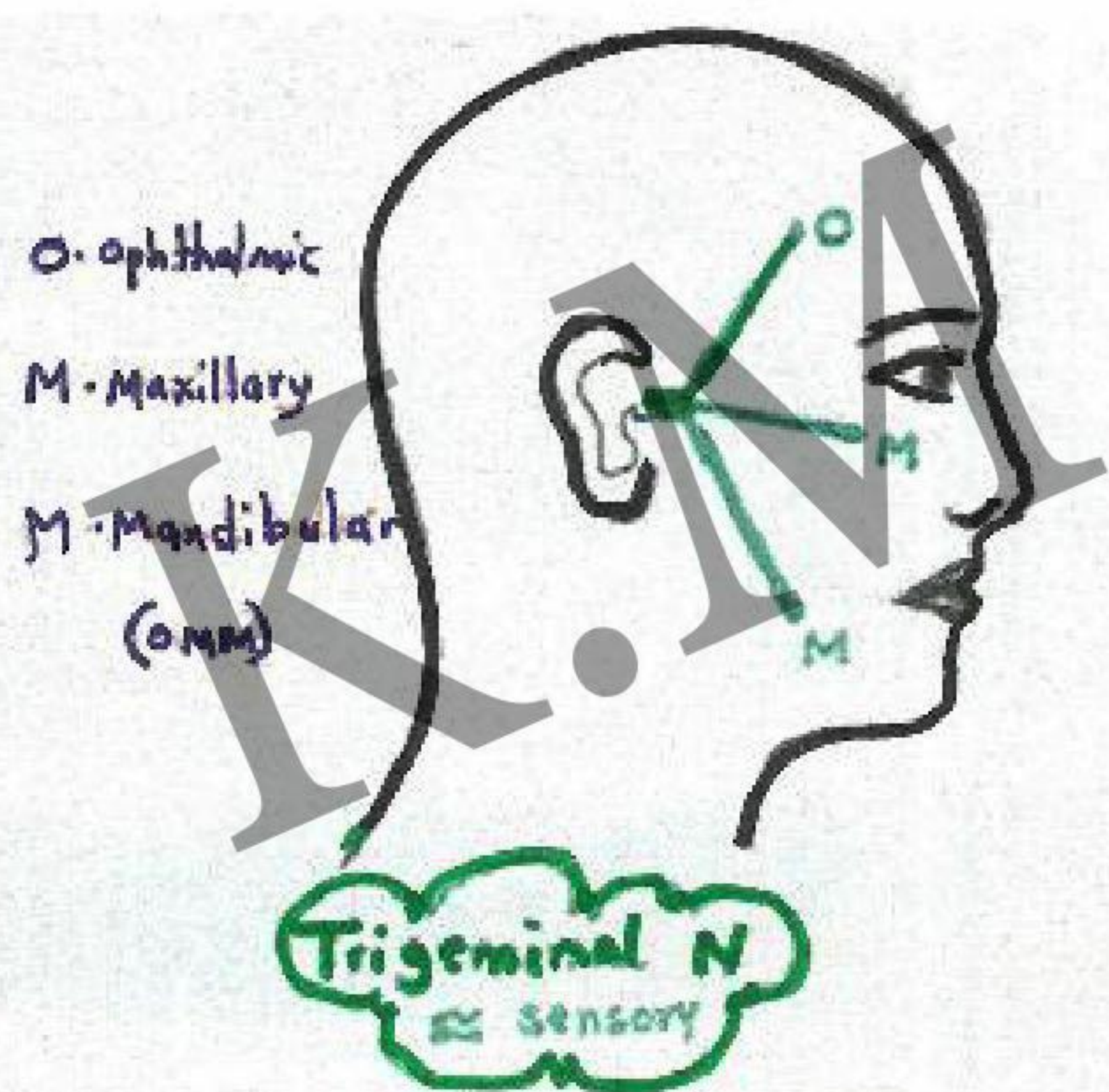
1. Temporal br.:- emerge from upper border of parotid gland.
2. Zygomatic br:- " " anterior " " "
3. Buccal br:- " " " " " "
4. Mandibular br:- " " " " " "
5. Cervical br:- " " lower " " "

NB:- Temporal br. supplies ant. & superior auricularis, orbicularis oculi, corrugator supercilli & frontal belly of occipitofrontalis

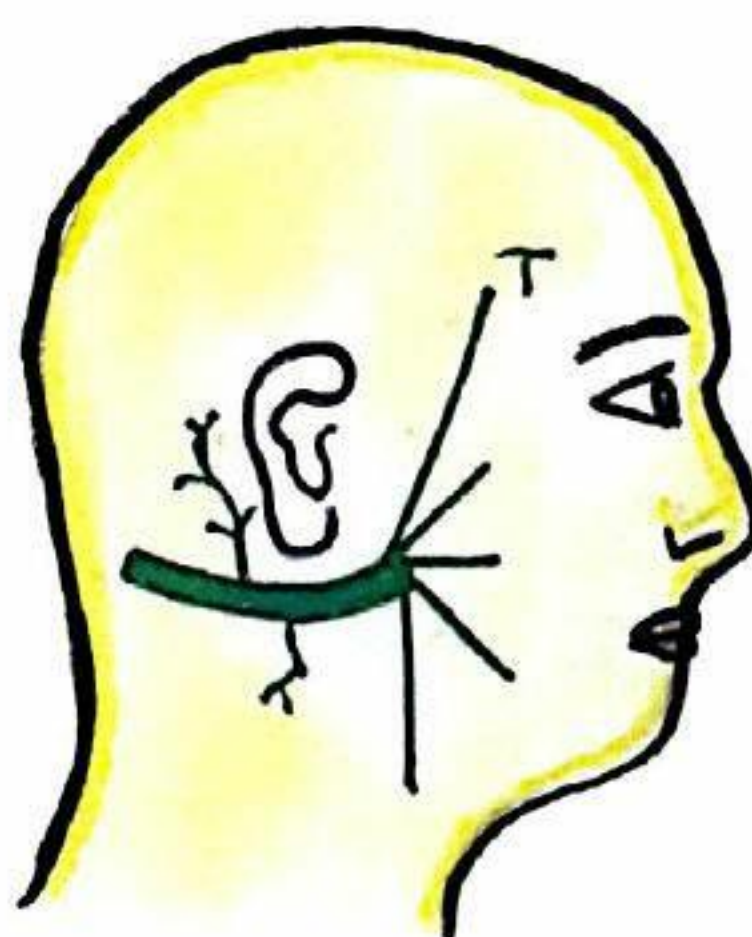
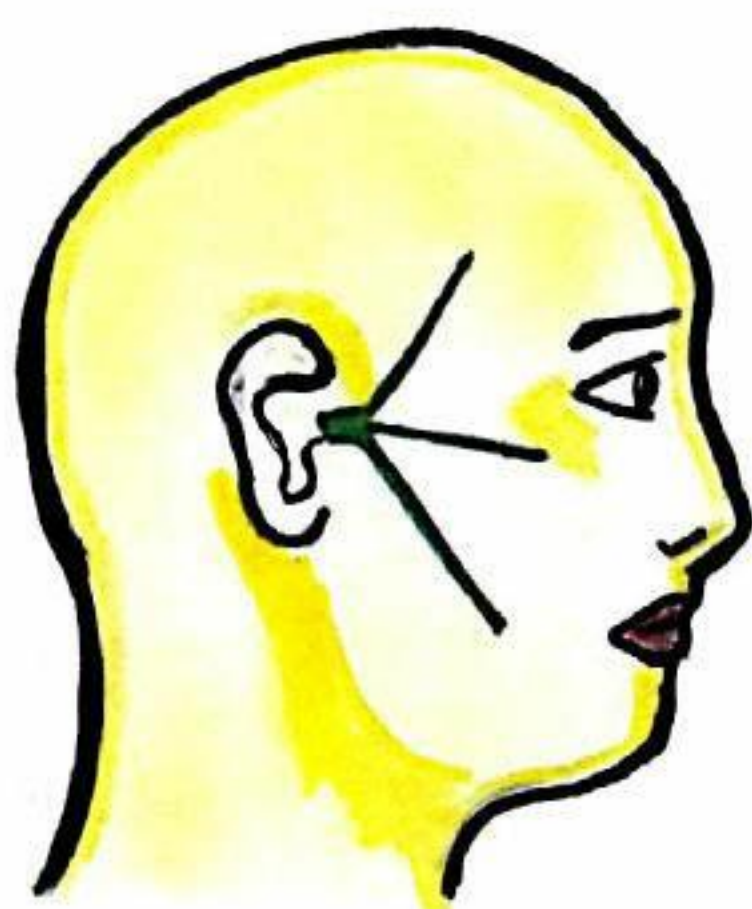
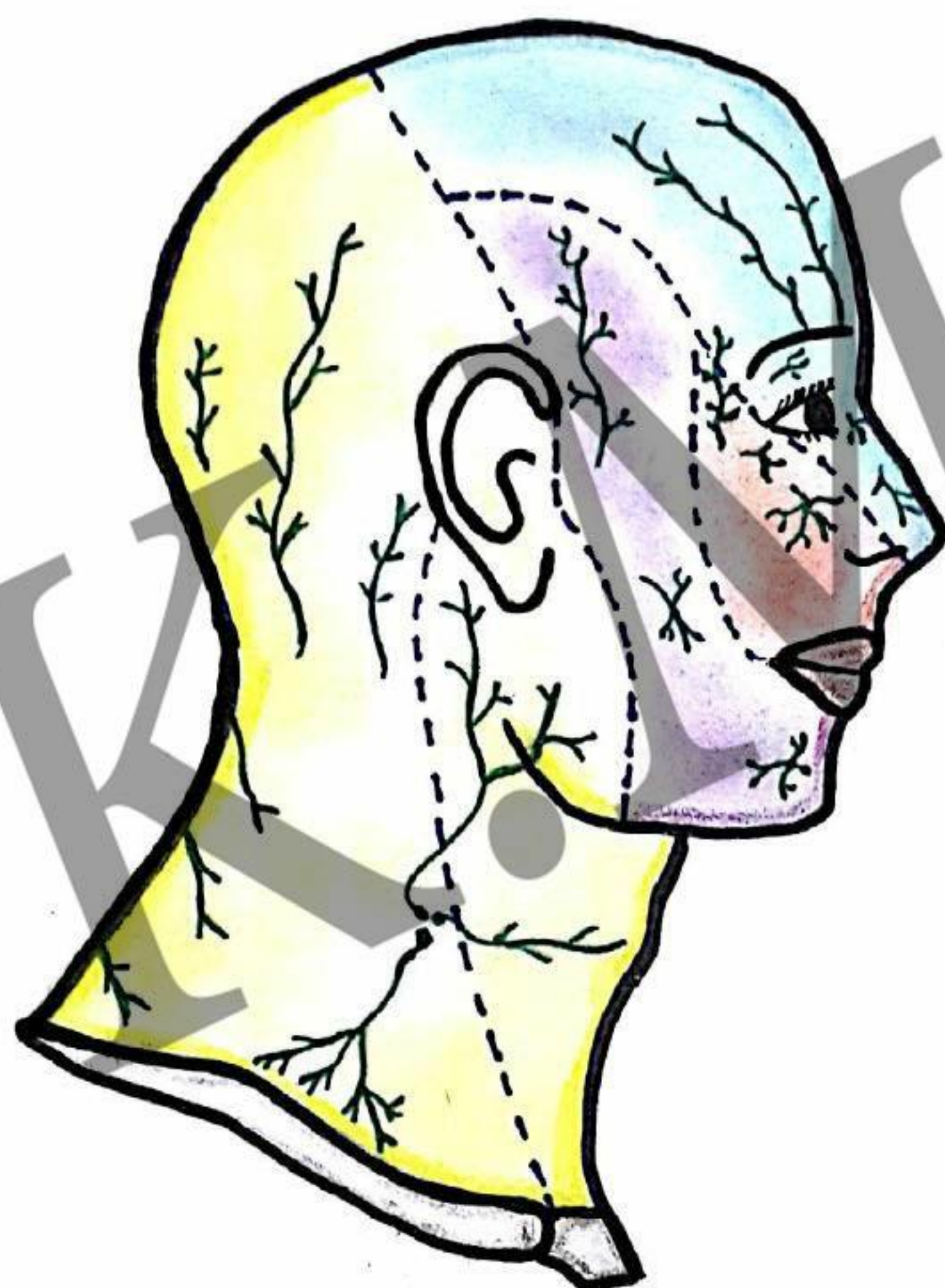
- Zygomatic br. to orbicularis oculi
- Buccal br. to buccinator ms, ms of upper lip & nostrils & orbicularis oculi
- Mandibular br. to ms of lower lip.
- Cervical br. to platysma, (it passes forward below mandible)



N. supply of skin of head & Neck



⑦b



ARTERIAL SUPPLY OF FACE :-

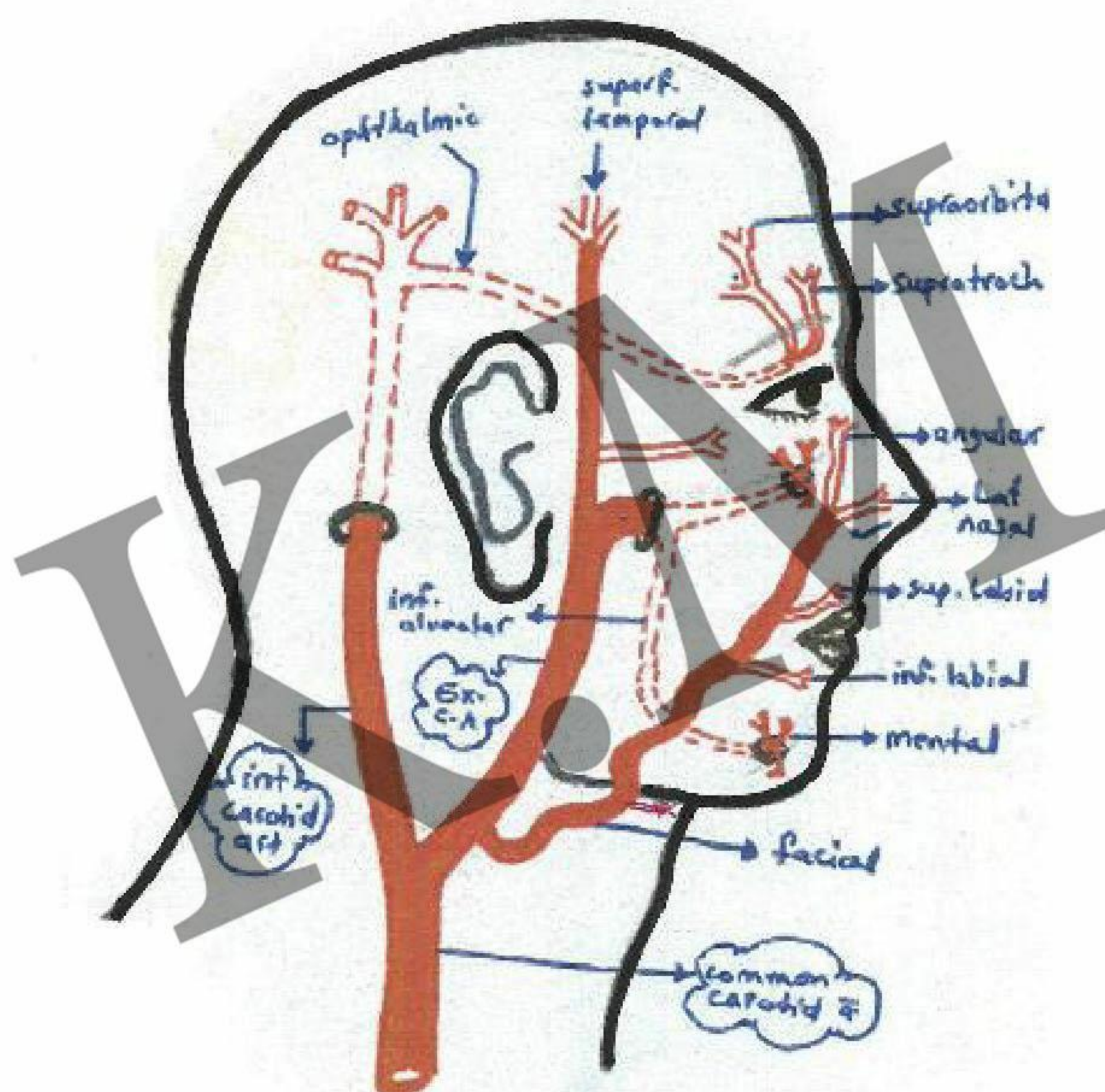
- ① Facial artery :- branch of external carotid artery.
- It is the main supply of face.
- ② Transverse facial :- br. of superficial temporal inside parotid (from ext. c. A)
- emerges from ant. border of parotid (below zygomatic arch)
- ③ Supratrochlear :- } branches of ophthalmic a (br. of internal carotid a)
- ④ Supraorbital :- }
- ⑤ Infraorbital a :- continuation of maxillary a (br. of ext. carotid ^{E.C.A})
- ⑥ Mental artery :- br. of inf. alveolar (from maxillary → E.C.A)

* FACIAL ARTERY :

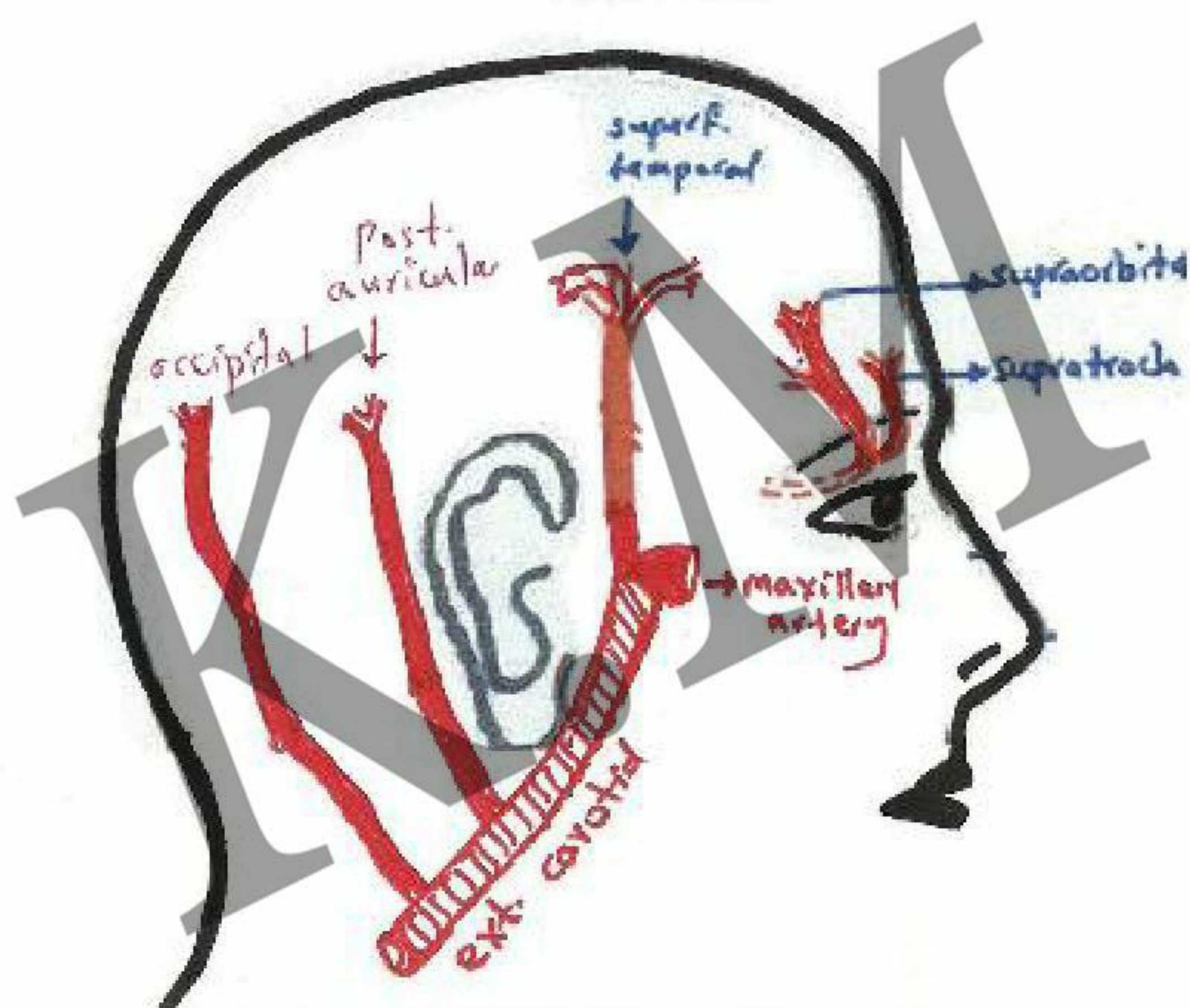
- * Origin :- highest of 3 branches arising from ant. aspect of E.C.A.
- * End :- at medial angle of eye (continue as angular artery) ^{→ anastomose with ophthalmic artery}
- * Course & relation :- in neck arches upward over submandibular gland curves around inf. margin of mandible at anterior, inferior angle of masseter (palpable pulse).
- runs upward toward angle on mouth in tortuous course then upward along nose to medial angle of eye
- ascend in front of facial vein; covered by platysma & resorius m deep to zygomaticus muscles & levator labii superioris, superficial to buccinator

- * Branches :- ① Angular artery; (continuation of facial at medial angle of eye)
- ② Superior labial :- to upper lip.
- ③ Inferior labial :- to lower lip.
- ④ Lateral nasal :- to nose. (nasal)
- ⑤ Submental :- arise in neck (at lower border of mandible) ^{& lower lip} supply chin
- ⑥ Submandibular (glandular) to submandibular gland in neck.
- ⑦ Tonsillar branch. :- to palatine tonsils. (arise in neck)
- ⑧ Ascending platine (arise in neck).

NB:- facial a. in the neck ascend deep to stylohyoid & post. belly of digastric m & angle of mandible (in submandibular triangle).



Arteries of face



Arteries of scalp.

VENOUS DRAINAGE OF FACE :-

① FACIAL VEIN (ant. facial) :-

- formed by union of supratrochlear & supraorbital veins at medial angle of eye. "descends behind facial artery"
- Ends by joining anterior division of retromandibular vein to form common facial vein which ends in internal jugular v.
- Tributaries are:
 - 1- supra trochlear & supraorbital veins.
 - 2- lateral nasal vein.
 - 3- superior & inf. labial.
 - 4- submental vein.
- Connections of facial vein :-
 - 1- superior ophthalmic vein :- directly through supraorbital vein
 - 2- cavernous sinus :- through sup. ophth. vein.
 - 3- pterygoid venous plexus : by deep facial vein

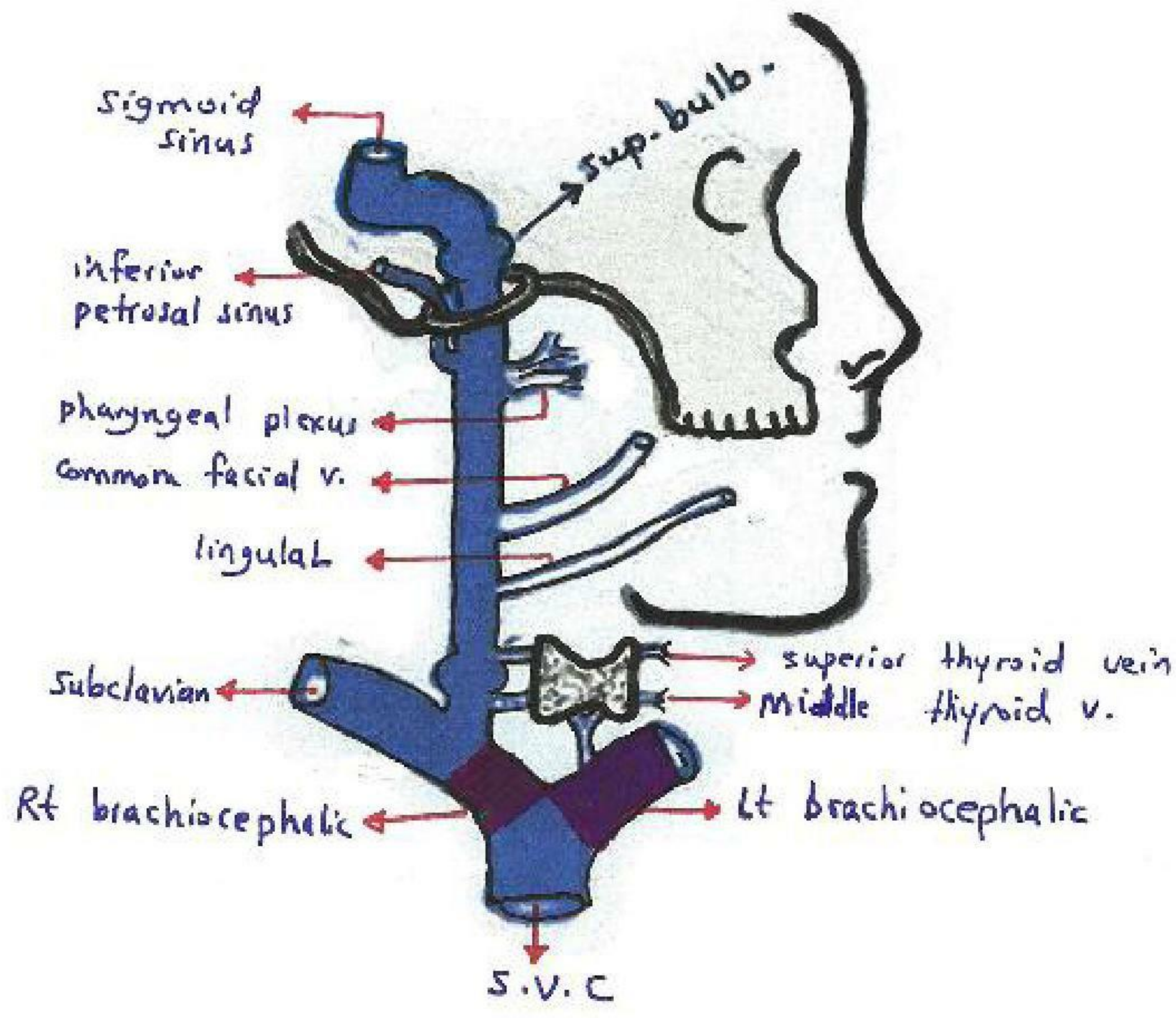
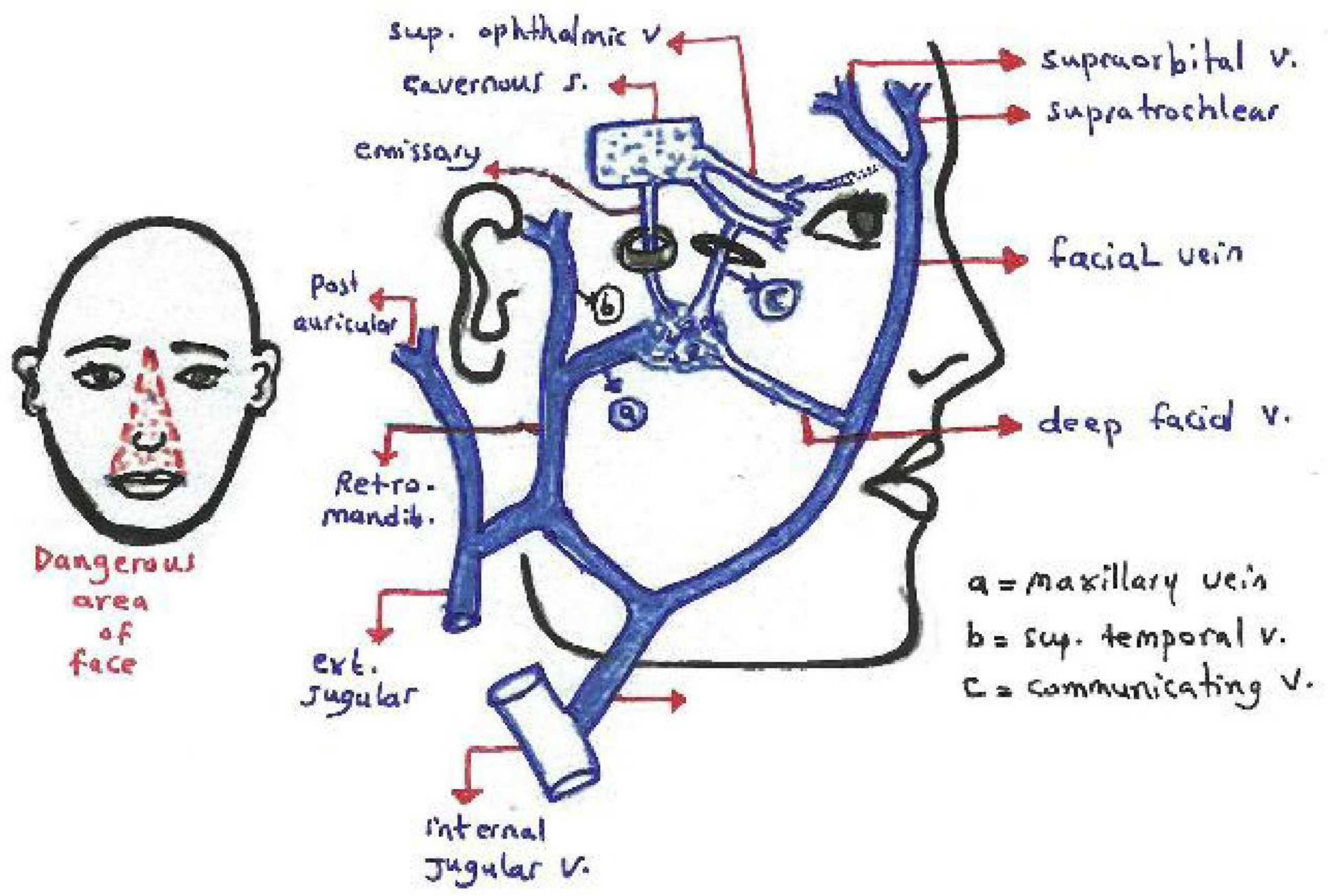
② RETROMANDIBULAR V. (post facial) : formed by union of

Pterygoid Plexus :-

- Is a network of veins in infratemporal fossa (around lat. pterygoid ms.)
- formed by veins corresponding to maxillary artery branches.
- Ends in maxillary vein that unites with superficial temporal vein to form retromandibular v. inside parotid gland.
- Communicates with facial vein through deep facial.
 - cavernous sinus through emissary veins (through foramen ovale & lacerum).
 - inferior ophth. v. via communicating vein (through inferior orbital fissure).

Dangerous area of face :-

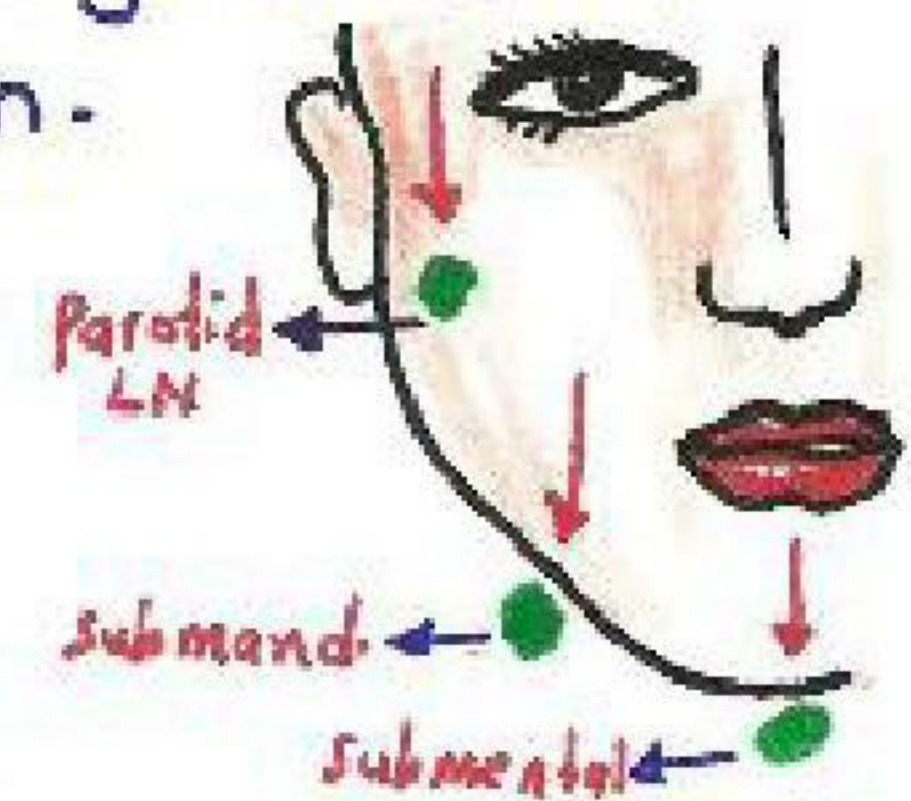
- area of nose & upper lip is connected to cavernous sinus by supratrochlear, supraorbital & facial vein as mentioned above so infection in this area may → cavernous sinus thrombosis



VENOUS DRAINAGE OF FACE

LYMPH. DRAIN. OF FACE

- Submandibular L.N. :- from forehead & ant. part of face.
- Parotid LN :- Lymph from lateral part of face & eyelids (lat. part)
- Submental LN :- central part of lower lip & chin.



MUSCLES OF FACE

- Muscles of facial expression are subcutaneous (in superf. fascia) and they are thin & pale.
- embryologically arise from 2nd branchial arch so supplied by pharyngeal facial nerve.
- they have bony origin but inserted to skin (without tendon)
- they are arranged around orifices of face (orbit, nose & mouth) acting as dilators, sphincters & modify face expression.

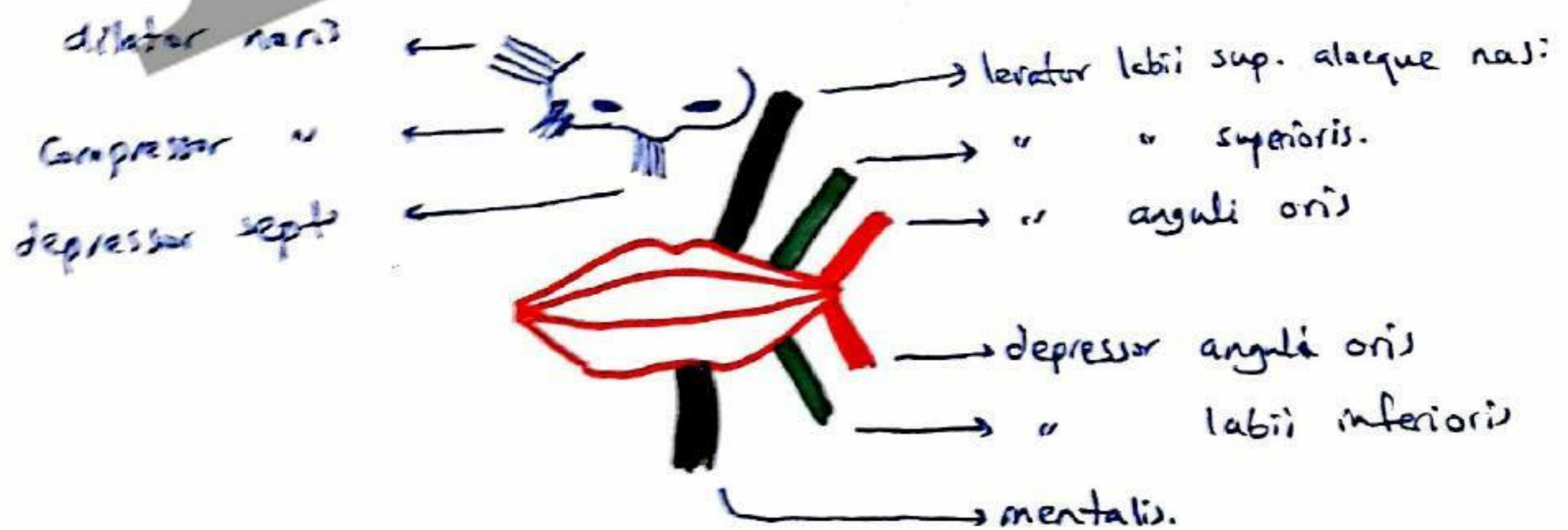
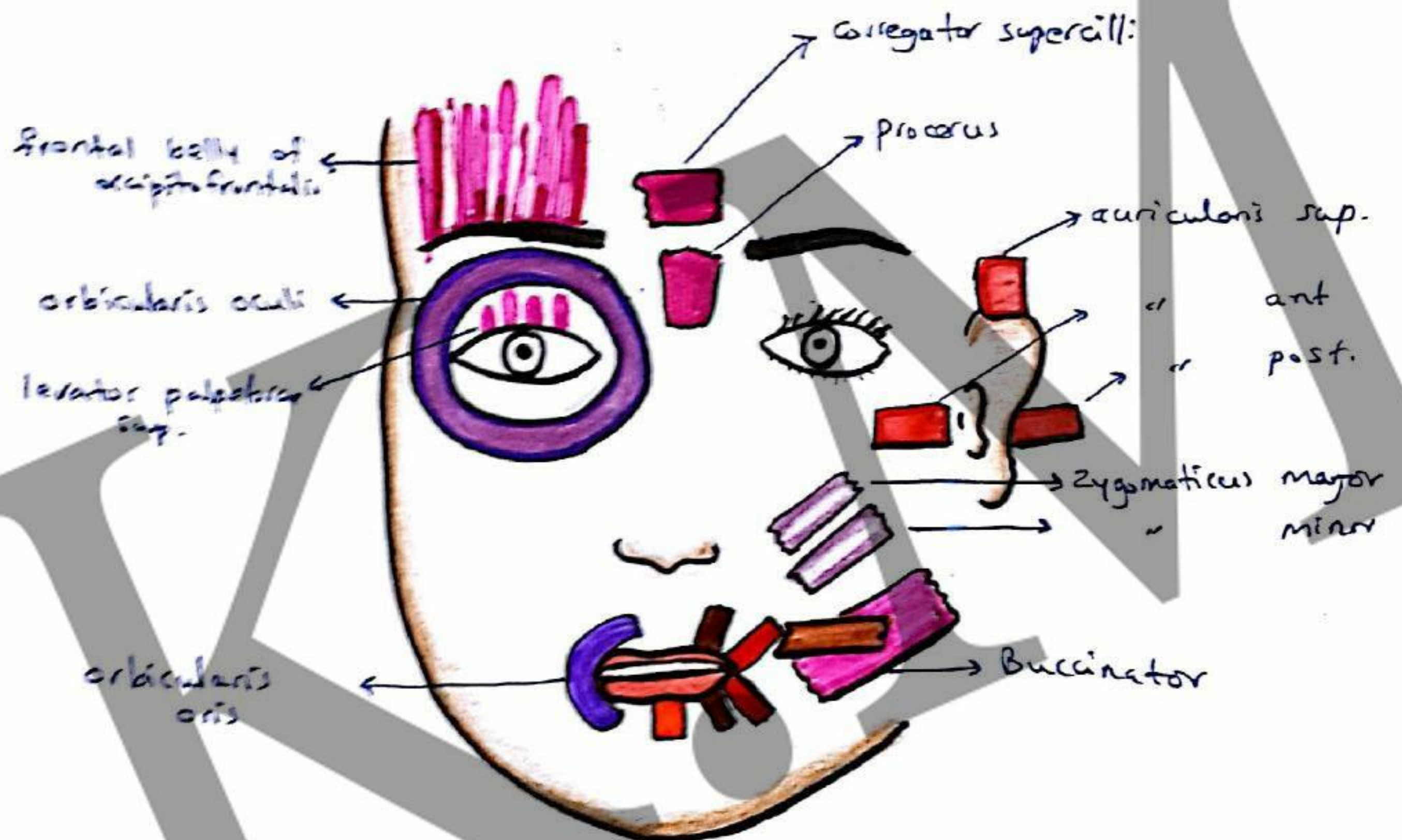
* Muscles of face are classified as :-

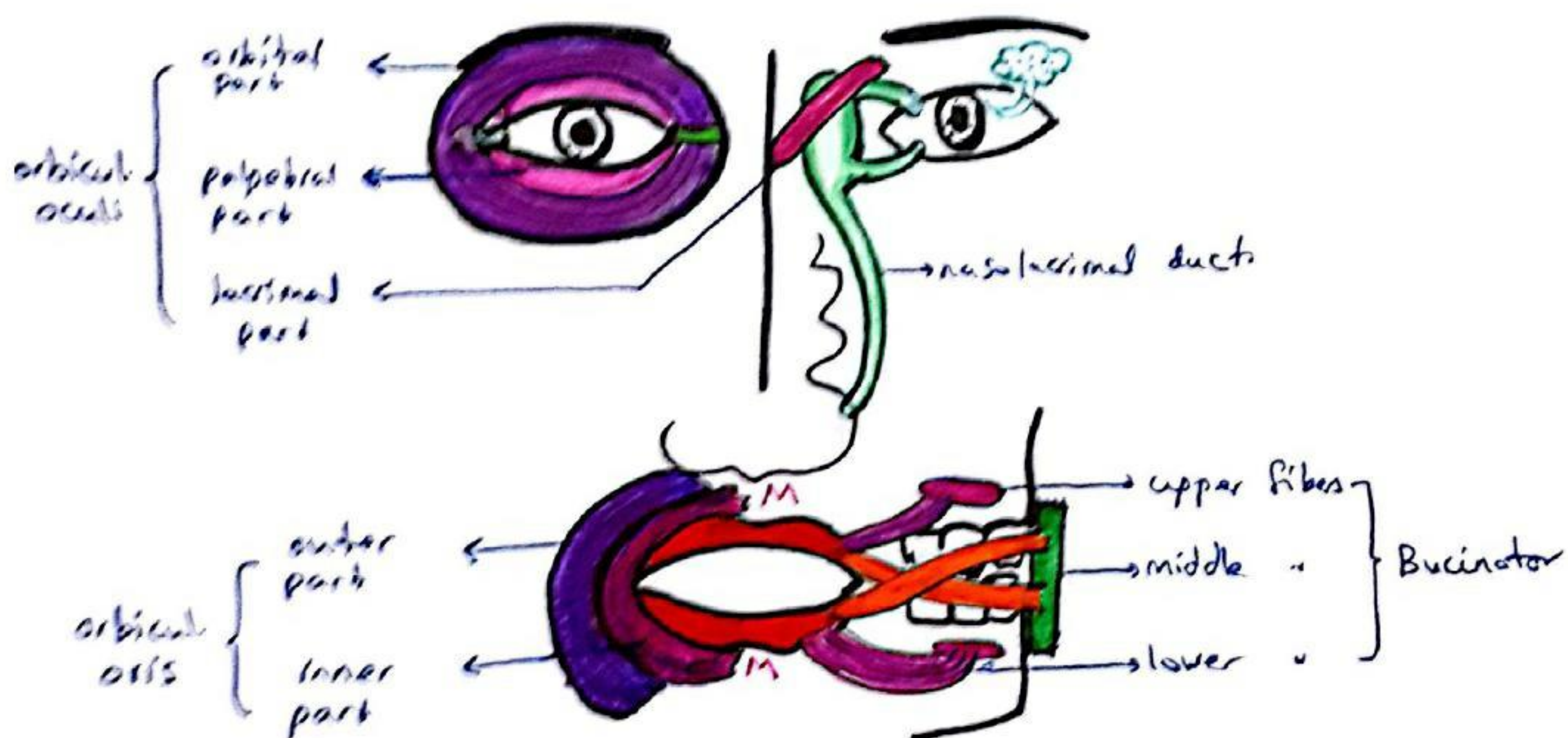
- Eyelid muscles :-
 - Orbicularis oculi → (sphincter)
 - levator palpebrae superioris } → (dilator)
 - occipito frontalis muscle }
- Nostril muscles :-
 - Compressor & dilator naris.,
 - depressor septi
- Lip muscles → :-
 - orbicularis oris (sphincter)
 - Levator labii superioris
 - levator anguli oris
 - depressor labii inferioris
 - depressor anguli oris
 - Zygomaticus minor & major
 - risorius, mentalis
 - levator labii superioris alaeque nasi muscle

} dilator of lip
- other muscles → :-
 - Corrugator supercilli.
 - Procerus, malaris, auricularis ms
- Cheek muscle → :- Buccinator.

sup.
ant
posterior

Ms of facial expression

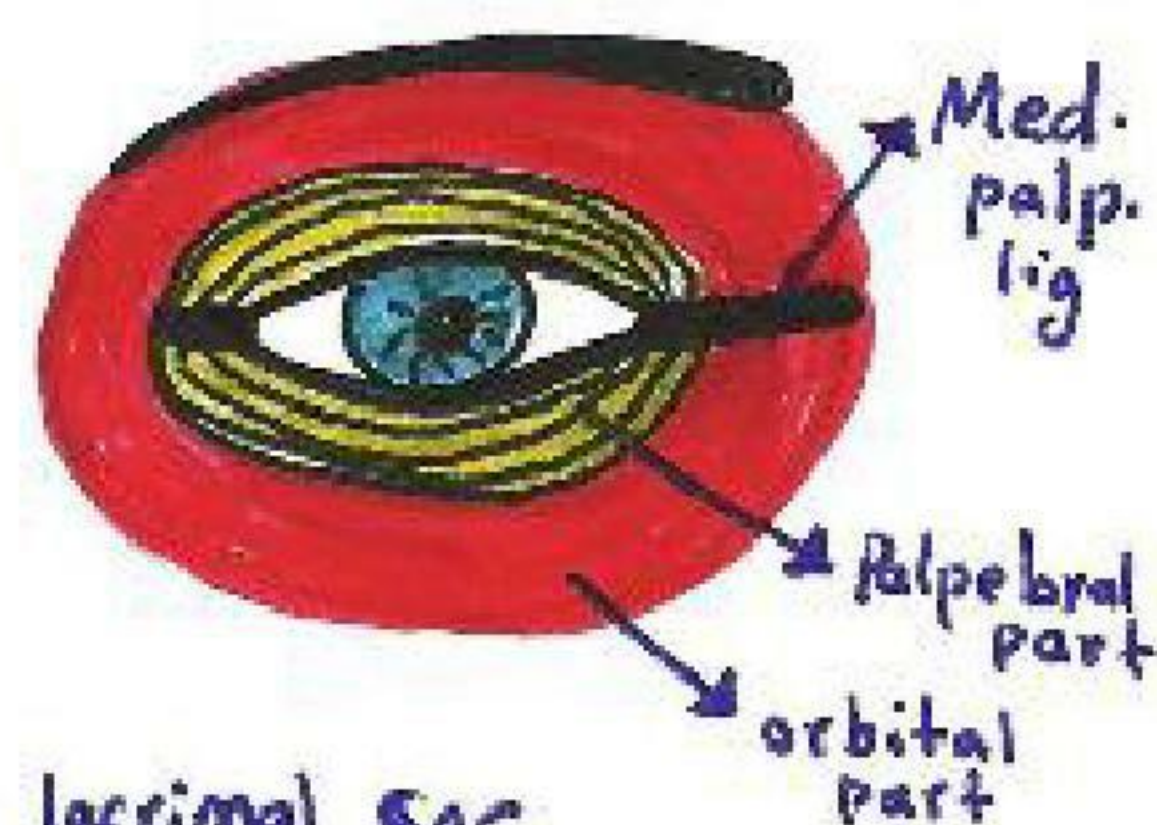




ORBICULARIS OCULI :-

* Origin & insertion :-

- Palpebral part :- arise from medial palpebral lig. inserted into lat palpebral ligament.
- Orbital part :- from medial palpebral lig. & loops to be inserted to medial palpebral lig. (circle)
- Lacrimal part :- from lacrimal crest & fascia covering lacrimal sac to be inserted to eyelids.



* Nerve supply :-

- Temporal & zygomatic branches of facial nerve. [7th CN].

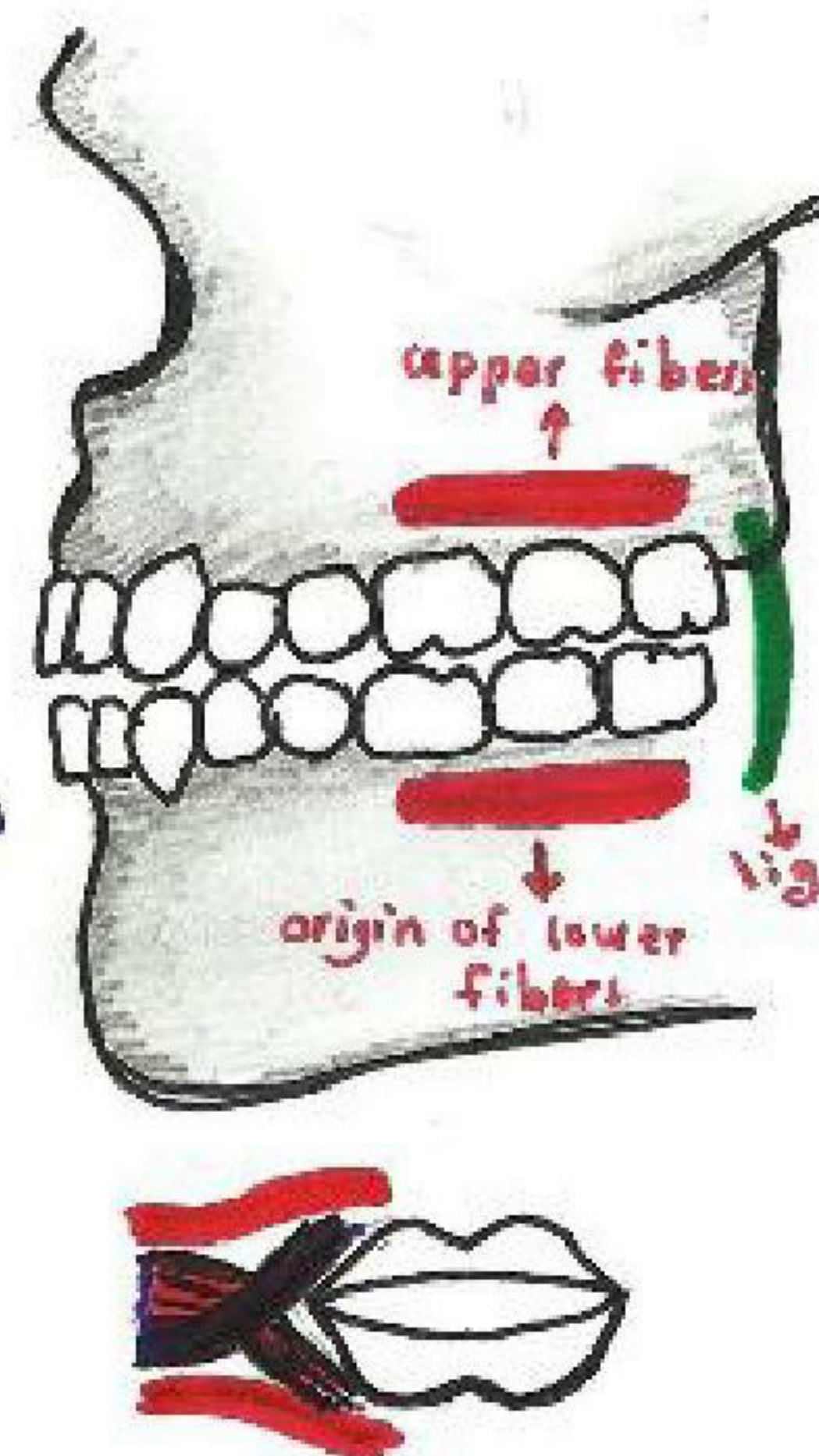
* Action :-

- Palpebral part :- closes the eye lightly (as blinking or sleep).
- orbital part :- " " " forcibly (to avoid danger) (screwing up eye)
- lacrimal part :-

BUCCINATOR :-

* Origin & insertion :-

- Upper fibers :- from alveolar margin of maxilla (above the 3 molar teeth) to upper lip.
- Lower fibers :- from alveolar margin of mandible (below the 3 molar teeth) to lower lip.
- Middle fibers :- from pterygomandibular lig. then the fibers decussate at angle of mouth where the upper part goes to lower lip & vice versa.



* Nerve supply :-

- buccal branch of facial nerve.

* Action :-

- Compresses the cheeks & lips against teeth. (used also in wistling).
- prevent accumulation of food in the vestibule of mouth.

ORBICULARIS ORIS (mouth sphincter) :-*** Origin & insertion :-**

- Extrinsic fibers :- from buccinator (mainly), inserted to lips.
- intrinsic fibers :- from maxilla & mandible encircling oral orifice.

*** N/supply :-** buccal br. of facial (& mandibular br.).*** Action :-** compresses the lips together.*** Corrugator supercilli :-**

- Origin: from medial part of superciliary arch, insertion: eyebrow (skin).
- N. supply: temporal br. of facial nerve.
- Action :- produce vertical wrinkles of forehead as in frowning

*** Procerus :-**

- origin: lower part of nasal bone, nasal cartilage, insertion: skin between eyebrows
- N. supply: buccal br. of facial nerve.
- Action :- wrinkles the skin of nose, pulls down medial end of eyebrow.

*** Compressor naris :-**

- origin :- frontal process of maxilla. insertion: aponeurosis of opposite muscle.
- N. supply: buccal br. (facial).
- Action: compresses the mobile nasal cartilages.

*** Dilator naris :-**

- origin: maxilla insertion: ala of nose.
- N. supply: buccal br. (facial).
- Action :- pulls ala laterally (widening nasal aperture), wrinkles nose skin.



Frontalis



Orbicularis oris



Mentalis



Depressor anguli oris



Zygomaticus major



Risorius



Corrugator supercilii



Nasalis



Procerus

Figure 7-7 Muscles of facial expression in action. These contractions are called "facial feedback."

PAROTID GLAND

* DESCRIPTION :-

- The largest salivary gland. (mainly serous acini)
- Position :- below external auditory meatus
 - between ramus of mandible & sternomastoid ms.
- Shape :- Wedge shaped (apex below → behind angle of mandible) "inverted" pyramid
- Lobes :- ~~two~~ Lobes (superficial & deep) by facial nerve.
 - accessory parotid: is a small part of gland over parotid duct.
- Capsule :- connective tissue capsule surrounding it.
 - dense fibrous capsule: derived from deep fascia of the neck (investing layer) which split into outer (sup.) layer ^{thick} attached to zygomatic arch & inner (deep) layer ^{thin} attached to base of skull, this part forms stylo-mandibular lig. (from styloid to angle of mandible) which separates the parotid from submandibular gland.
- Surfaces & borders :- It has 3 surfaces (superficial, anteromedial and posteromedial) with small superior surface → related to ext. auditory meatus
 - It has 3 borders (anterior, posterior & medial).

* Parotid duct (Stenson's duct) :-

- emerge from ant. border ^{superf. part.}, thick walled, 5 cm long.
- runs over masseter then pierces
 - ① Fat: buccal pad of fat.
 - ② Fascia: buccopharyngeal fascia
 - ③ Muscle: buccinator ms
 - ④ Mucosa of vestibule of mouth, after running an oblique course under mucosa (valve like mechanism to prevent inflation of duct during inflation of mouth).
- It opens in vestibule of mouth against upper 2nd molar tooth "crown"
- It is palpable on ant. edge of masseter (1 finger below zygomatic arch)
- It represented by the middle $\frac{1}{3}$ of a line bet. tragus of ear & midpoint bet. lip & ala.

RELATION :-

- Lateral : (superf.) :- skin, superficial fascia, parotid fascia & parotid L.N., with great auricular nerve.
- Anteromedial :- ramus of mandible, masseter & medial pterygoid ms also pharyngeal wall (sup. constrictor ms.).
- Posteromedial :- mastoid process, sternomastoid & digastric (post. belly), also styloid process & its attachment. & carotid sheath (ē its contents) [ext. carotid a. & facial N. enters through this surface].
(NB: carotid sheath contains ICA, IJV, 9, 10, 11 & 12 cranial nerves)
Int. carotid a.

STRUCTURES INSIDE GLAND :-

- there are 3 important structures within the gland (from inside to outside) :-
- ① External carotid artery :- divide inside it into 2 terminal br. (maxillary & sup. temporal)
- ② Retro-mandibular vein :- formed inside the gland by union of " & " "
- ③ Facial nerve :- divided into 5 terminal branches inside it & divides the gland into superficial & deep parts. (lobes).
- also some parotid L.N (deep parotid) lies inside it.

Relations of the borders :-

- from ant. border :- (A) - transvers facial artery
(D) - parotid duct.
(N) - Zygomatic, buccal & mandibular br. of facial N.
- from lower end :- (A) - Ext. carotid artery
(V) - Retro-mandibular vein
(N) - cervical br. of facial.
- from upper end :- (A) - superficial temporal artery.
(V) - " " vein
(N) - Temporal br. of facial n. & auriculo temporal n.

■ **NB** :- the parotid gland is supplied by external carotid artery and drains into retro-mandibular vein

■ **NB** :- lymphatics of the gland drains into parotid L.N. → deep cervical LN

NERVE SUPPLY of parotid

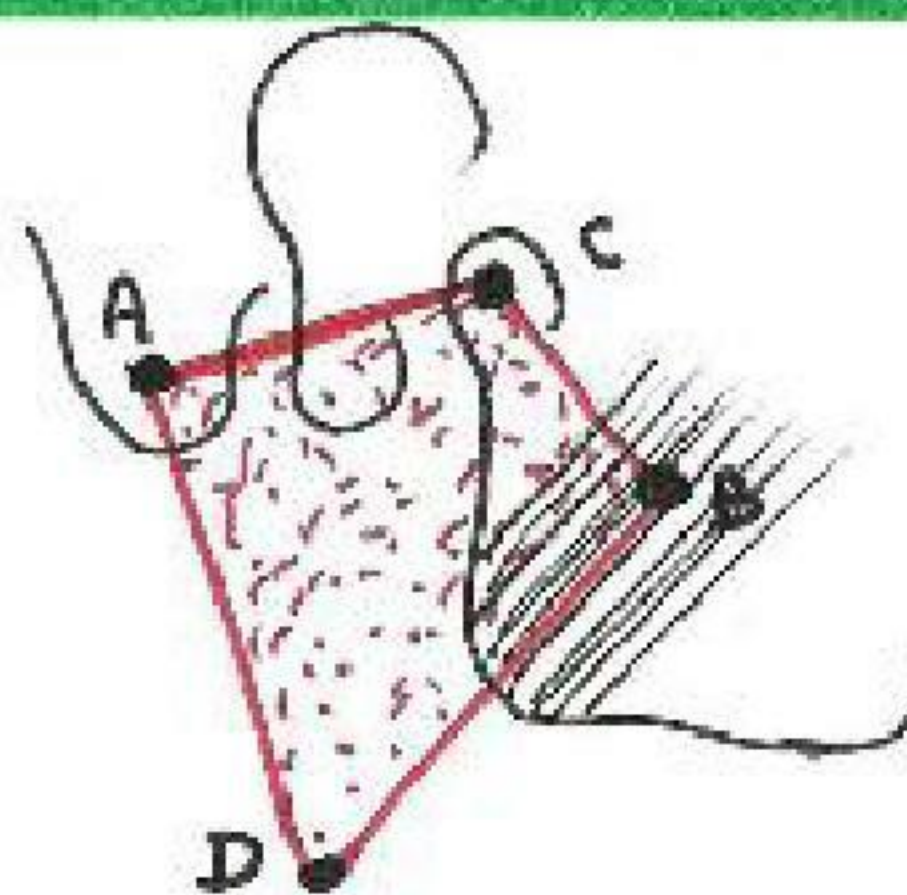
- Sympathetic ^{→ Vasomotor.} :- from symp. plexus around external carotid artery.
- Parasympathetic (secretomotor) :-
 - Preganglionic :- inf. salivary nucleus of 9th CN (glossopharyngeal) → tympanic br → tympanic plexus → lesser petrosal nerve → otic ganglion (relay).
 - Postganglionic :- reach the gland via auriculotemporal nerve.
- Sensory :- great auricular n. & auriculotemporal n.

APPLIED ANATOMY :-

- Parotid swelling are very painful because of tight capsule.
- Mumps is a viral infection & causes painful swelling.
- During parotidectomy (removal of parotid) facial nerve is preserved (but if cancer it is sacrificed).

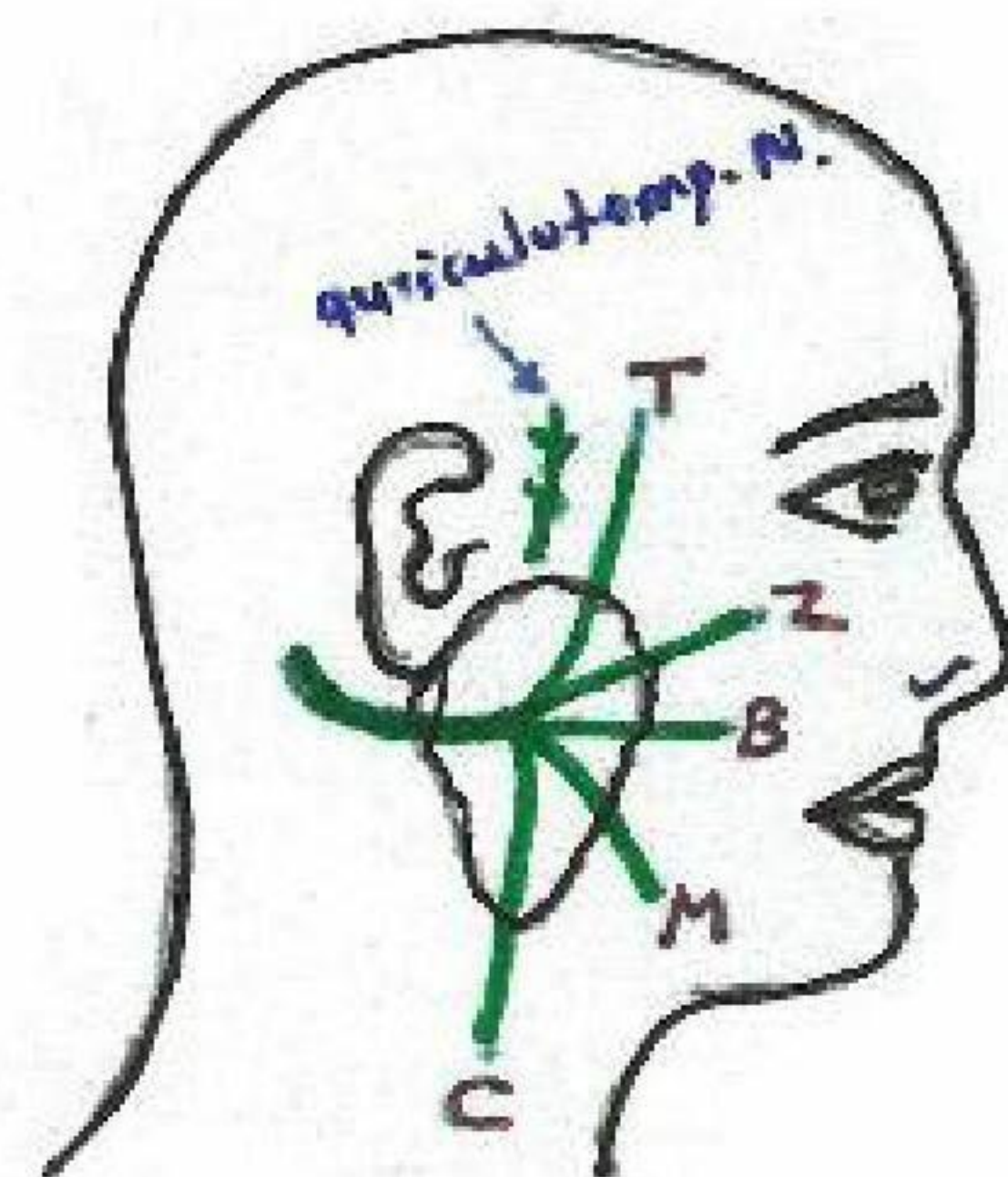
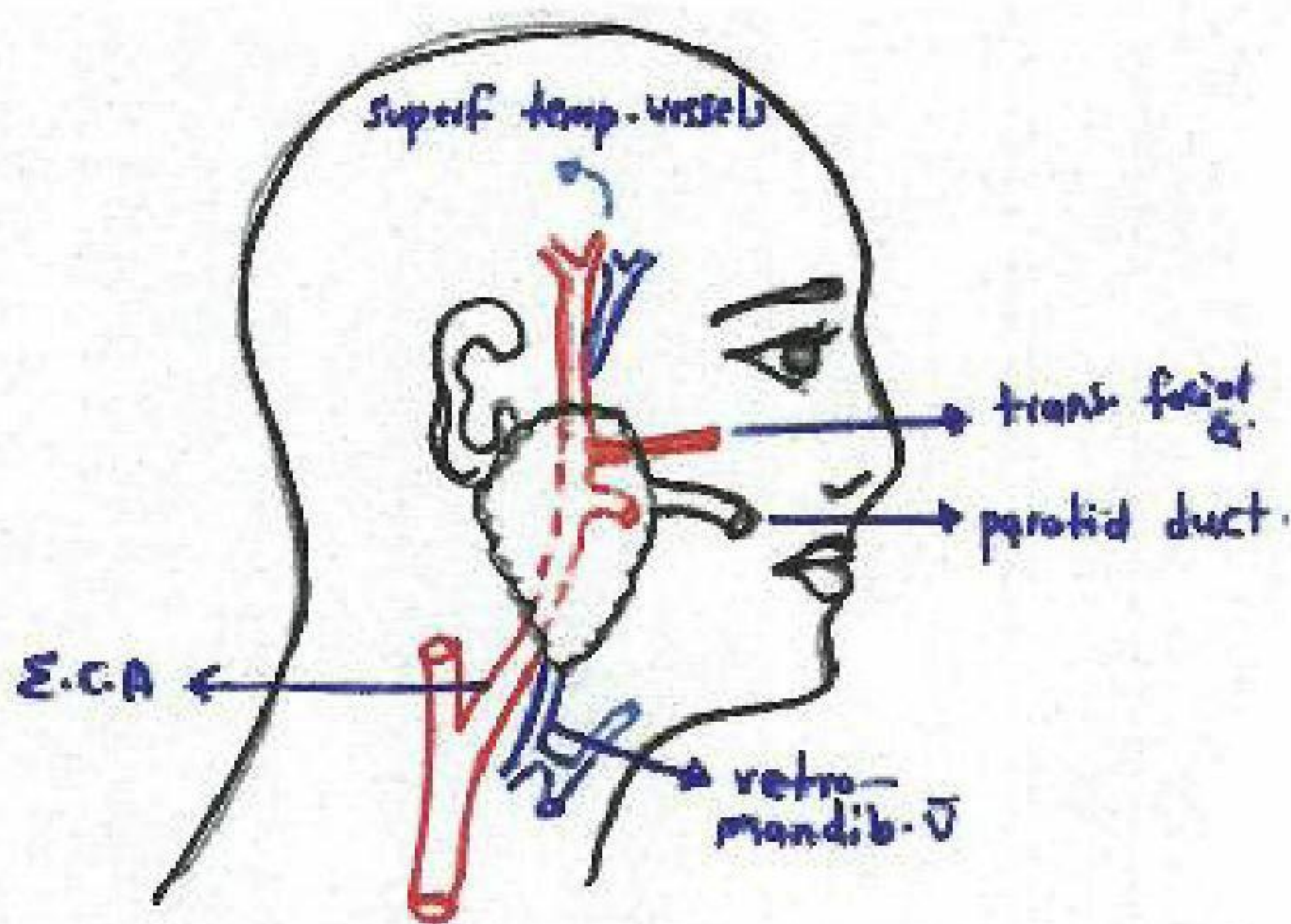
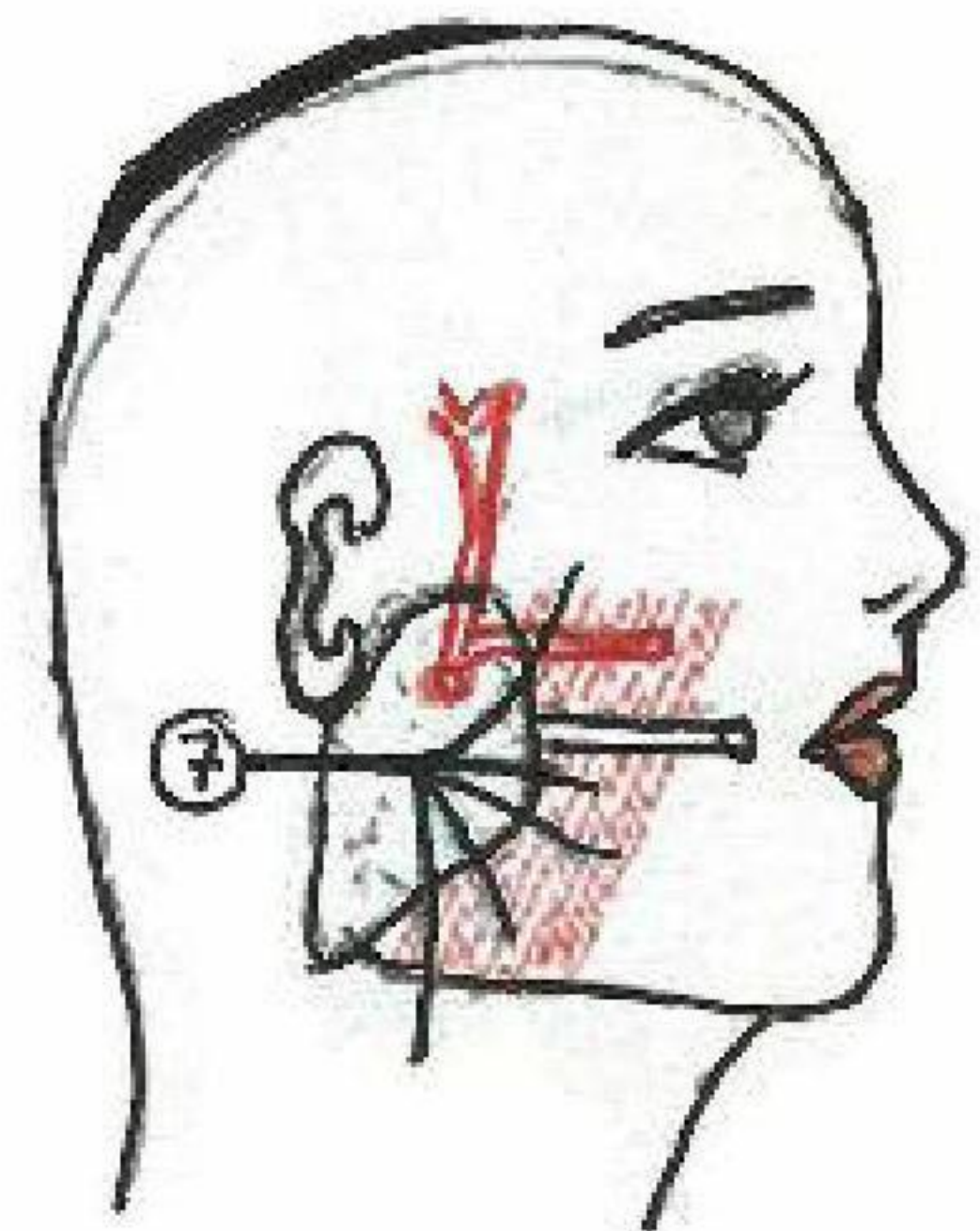
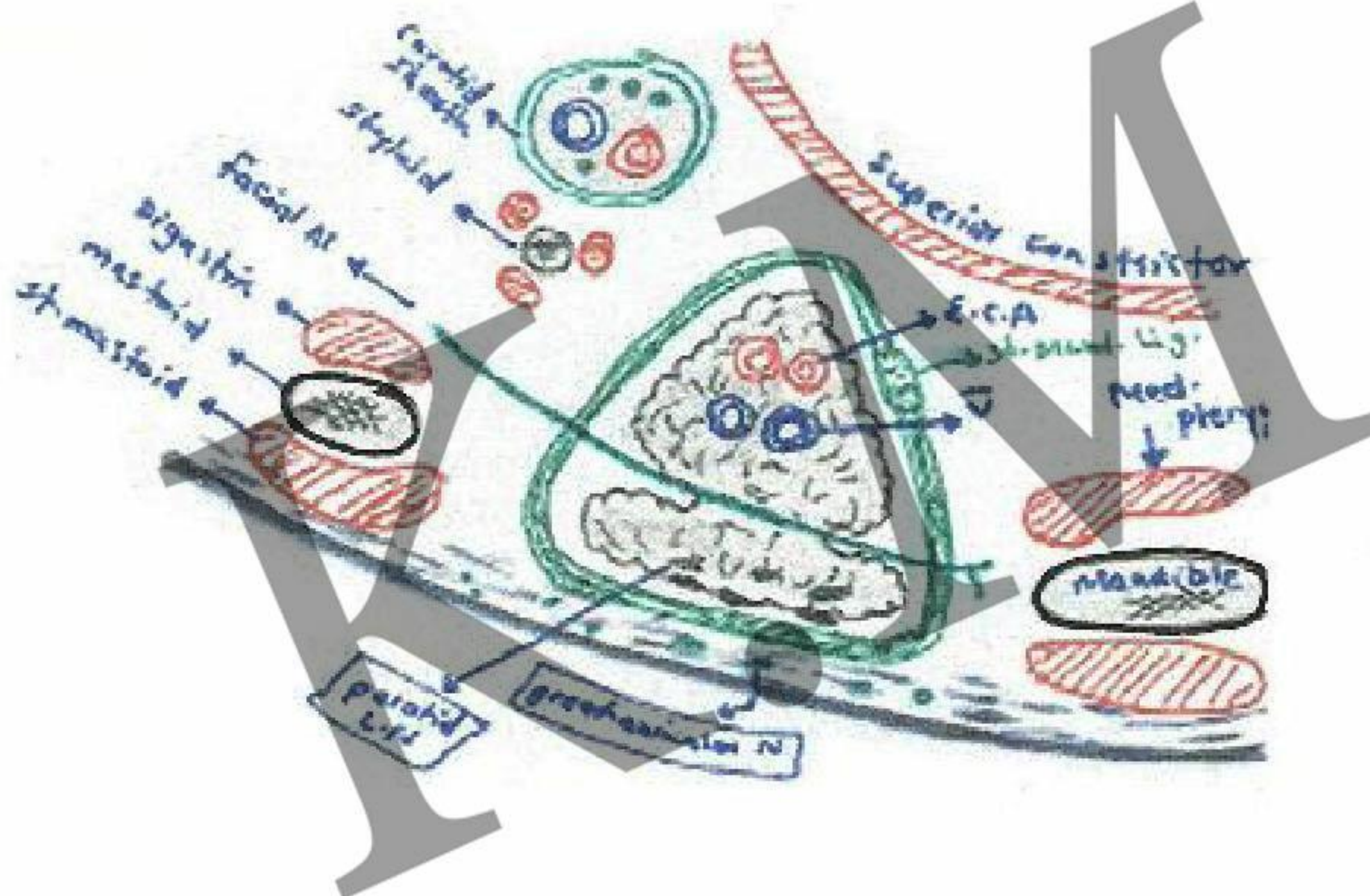
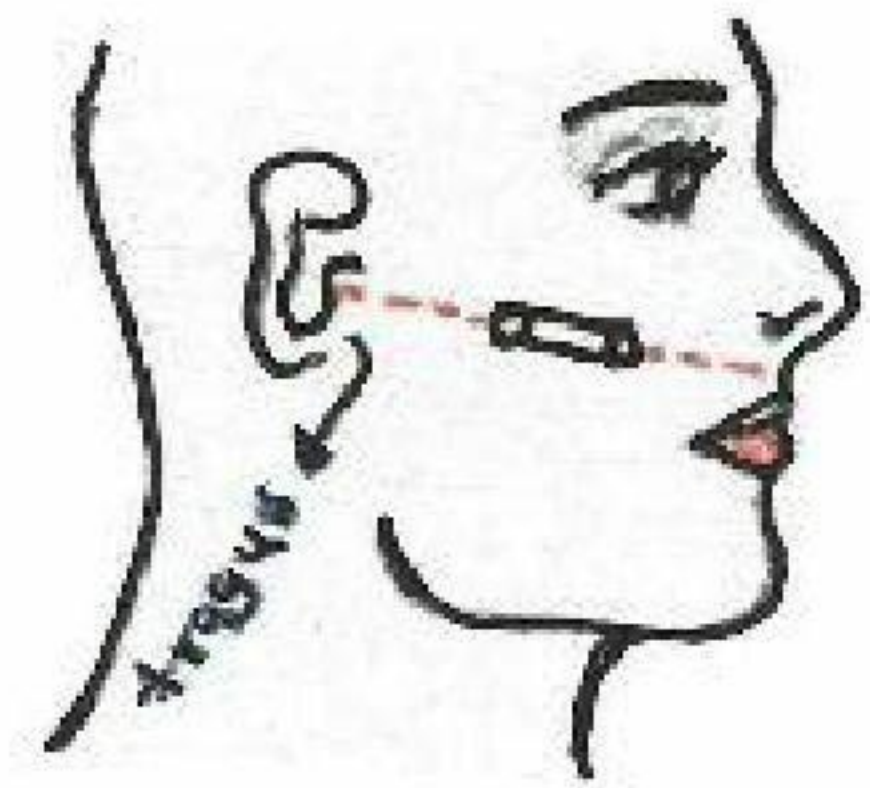
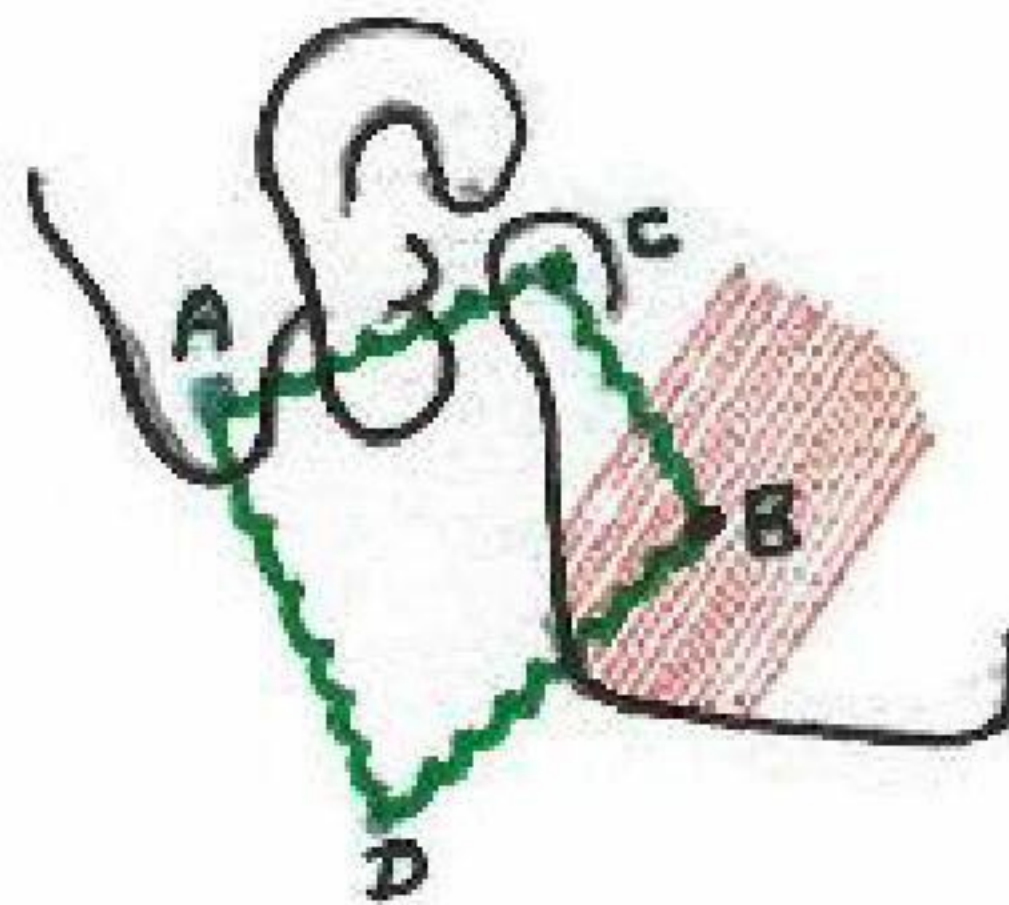
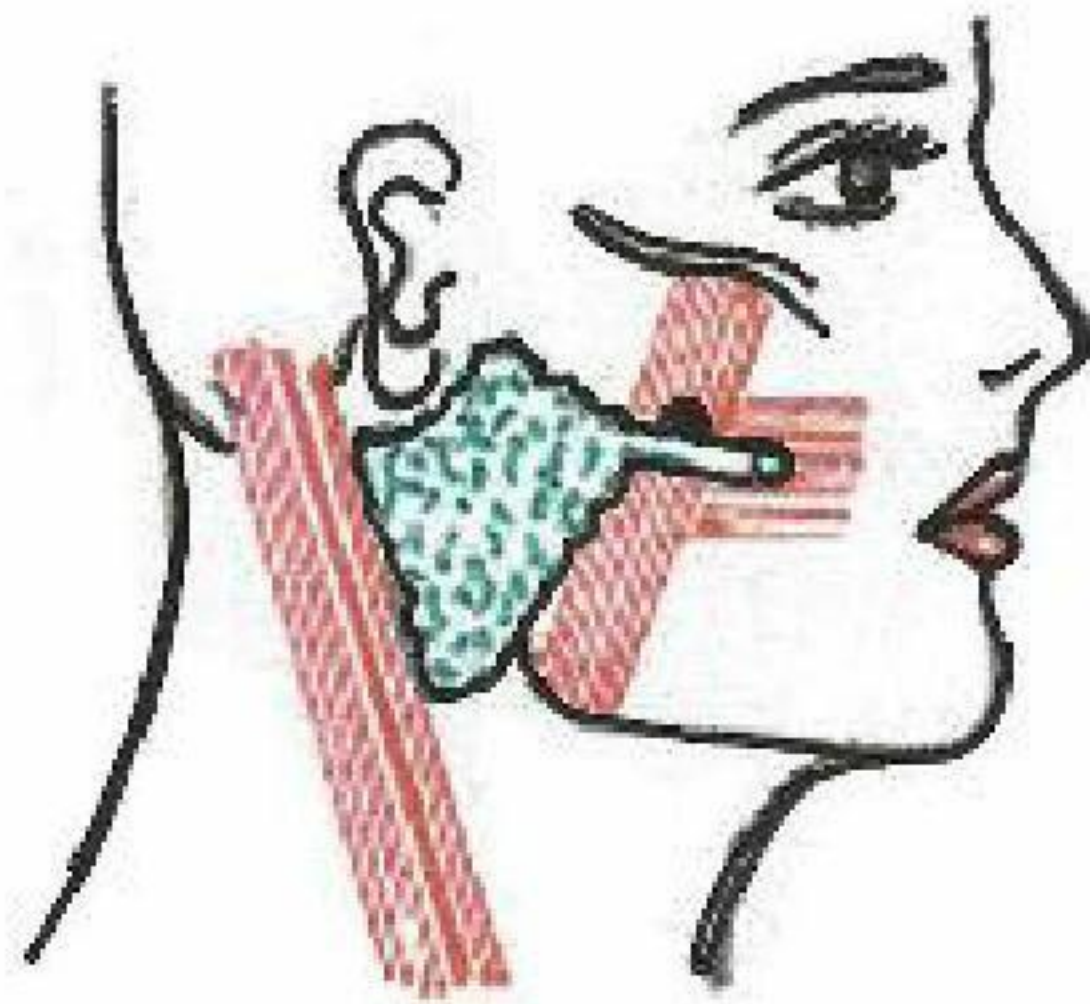
*Surface anatomy :- by 4 point

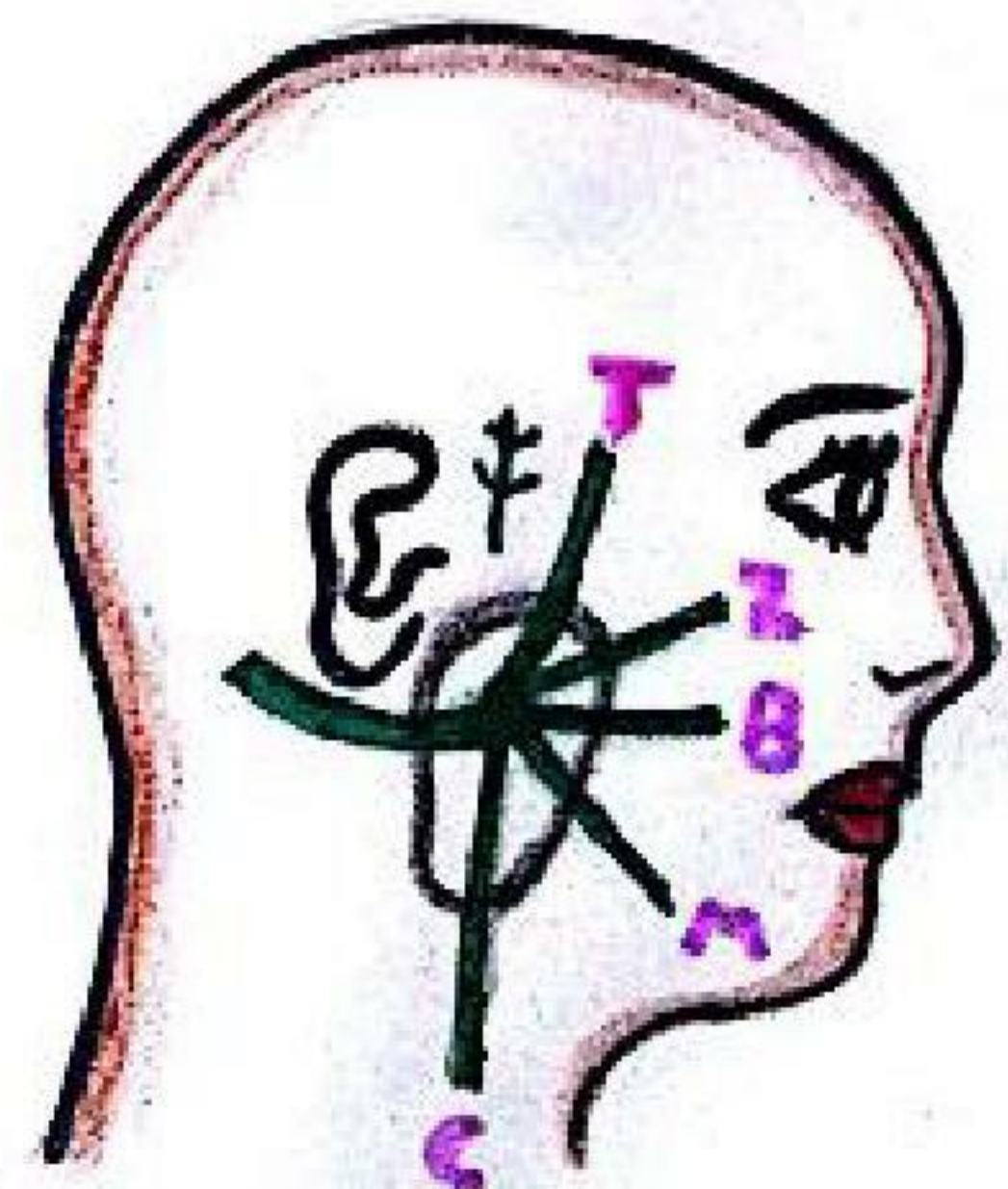
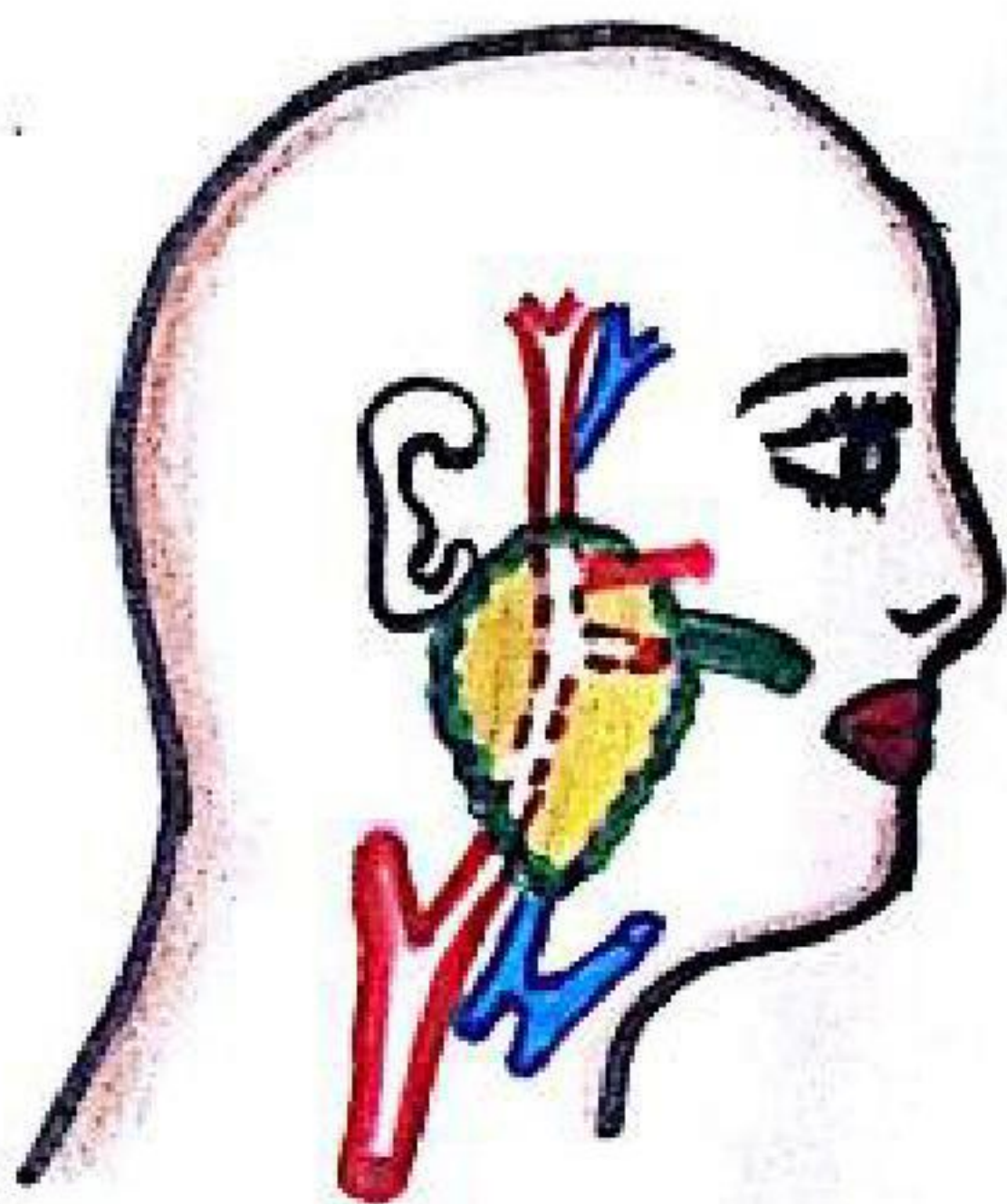
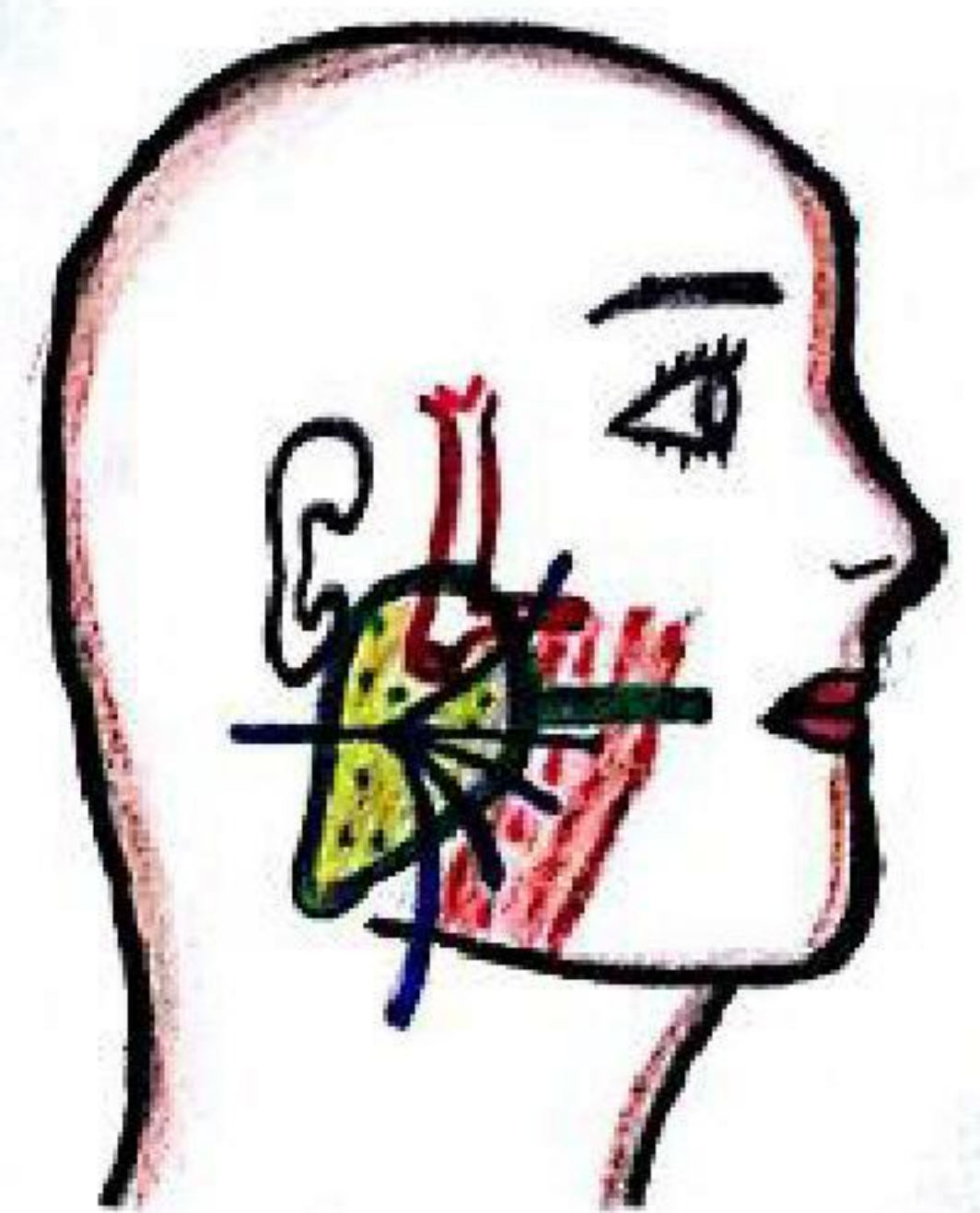
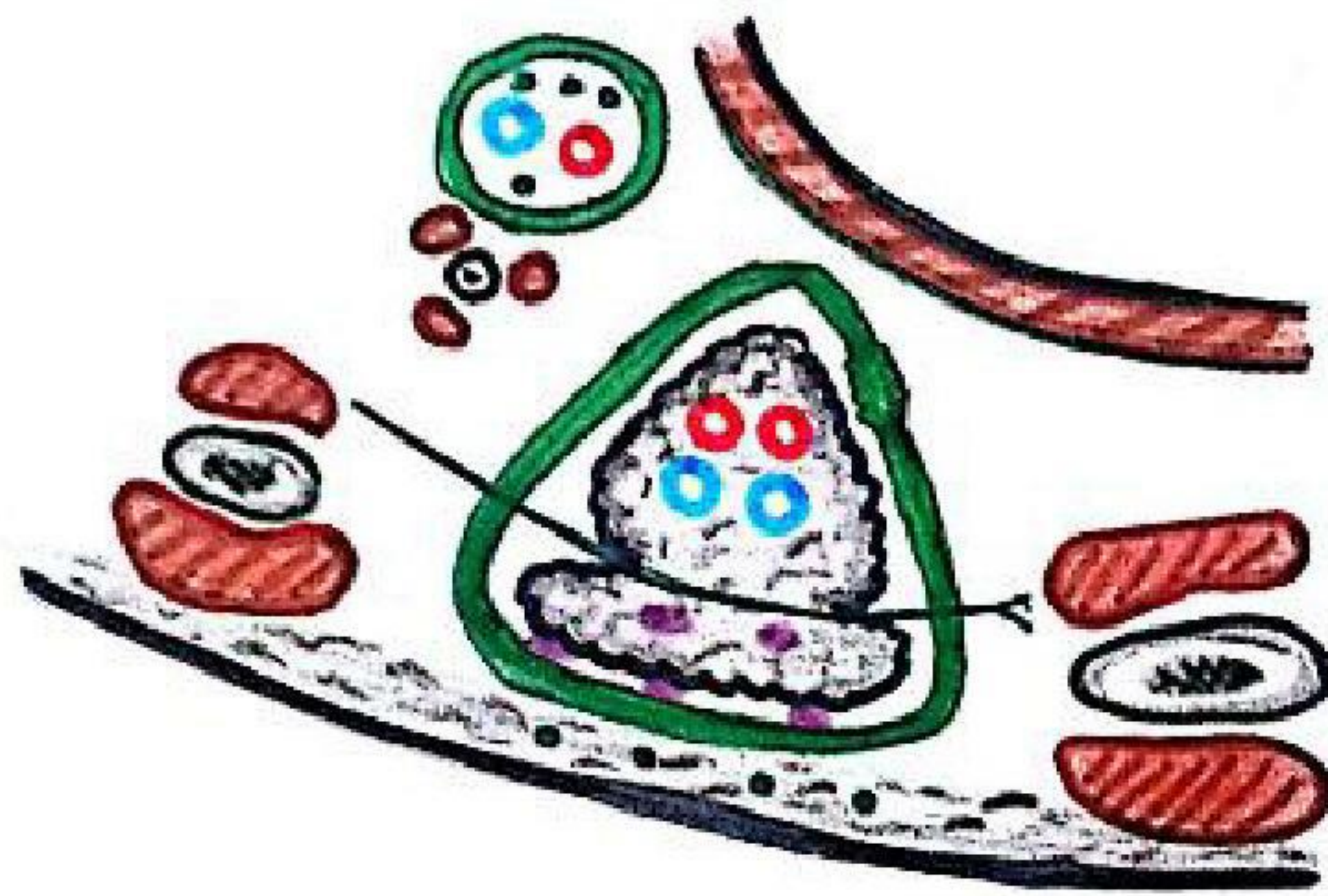
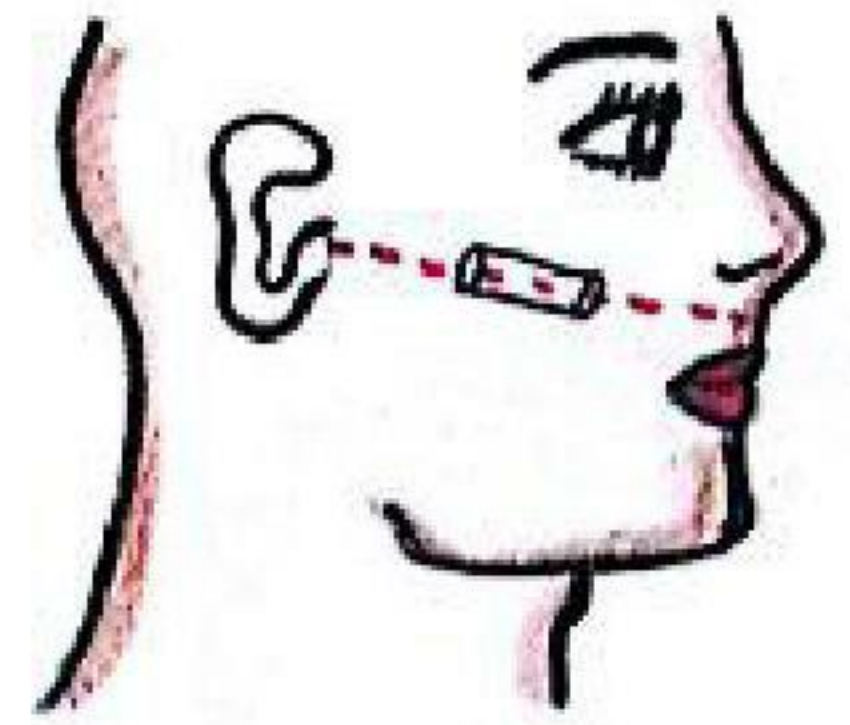
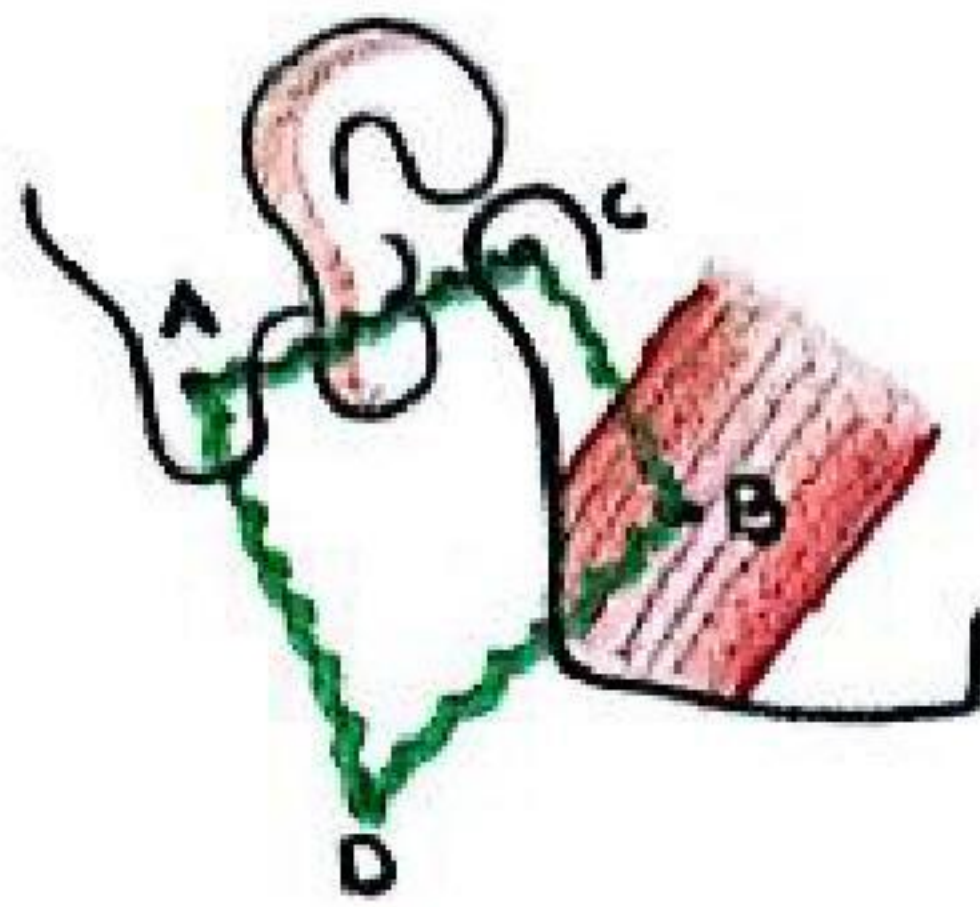
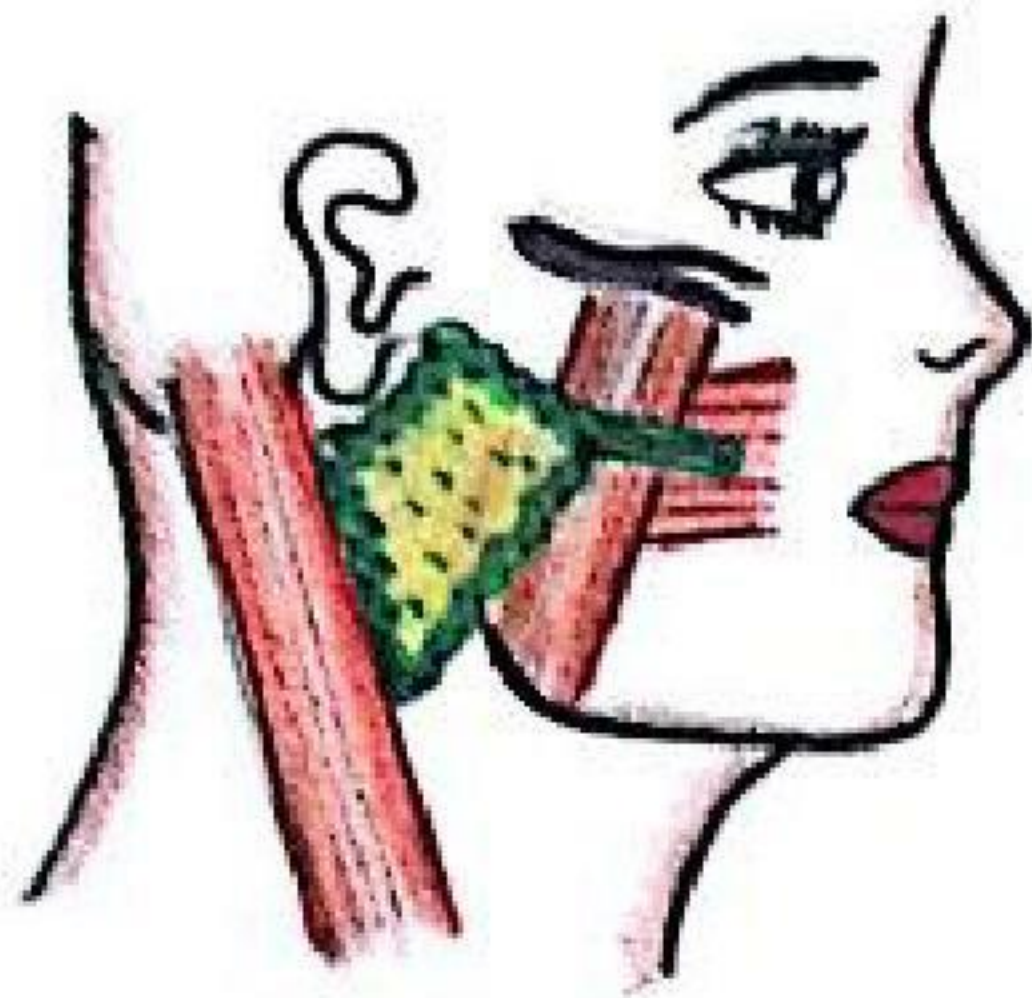
- A - point at mastoid
- B - at middle of masseter
- C - at head of mandible (tragus)
- D - 2 cm below & behind angle of mandible



PAROTID GLAND

15





TEMPORAL & INFRA-TEMPORAL FOSSA

TEMPORAL FOSSA :-

- * **Boundaries** :-
- above :- superior temporal line
 - below :- zygomatic arch.
 - front :- frontal process of zygomatic bone.

- * **Contents** :-
- Temporalis muscle & fascia.
 - deep temporal nerves & vessels.
 - superficial temporal vessels (artery & vein).
 - auriculo temporal nerve.

NB :- Pterion :- lies on the floor, H shaped suture formed by 4 bones (frontal, parietal, squamous part of temporal & greater wing of sphenoid), it is the weakest area of skull & related internally to middle meningeal artery (ant. division)

- It lies on side of head & communicated with infratemporal fossa deep to zygomatic arch.

INFRA-TEMPORAL FOSSA :-

- * **Boundaries** :-
- above :- greater wing of sphenoid (infratemporal surface of it)
 - front :- posterior surface of maxilla
 - behind :- styloid process.
 - Laterally :- rams of mandible
 - Medially :- lateral pterygoid plate

- * **Contents** :-
- ① Medial & lateral pterygoid muscles.
 - ② Mandibular nerve, chorda tympani & otic ganglion
 - ③ Maxillary artery & pterygoid plexus of veins.
 - ④ sphenomandibular lig. (small part of maxillary nerve).

MUSCLES OF MASTICATION

* Consists of :- ① Masseter.
③ Temporalis.

② Medial pterygoid.
④ Lateral pterygoid.

* NB :- They are developed from 1st branchial arch so supplied by mandibular division of trigeminal nerve. [by ant. division except Med. pterygoid by trunk]

- They are all inserted into mandible.
- They all elevate & protrude mandible except [Temporalis → retraction & lateral pterygoid → depression].

* Temporal fascia :- is a thick aponeurotic sheet over temporal fossa covering temporalis ms., superiorly attached to inf. temporal line inferiorly to ^{upper border} zygomatic arch (by 2 layers to inner & outer border) !

* TEMPORALIS :-

- origin :- from temporal fossa, temporal fascia (deep surface) & inferior temporal line.
- Insertion :- into coronoid process of mandible & ant. border of ramus of mandible (after passing deep to zygomatic arch)
- N./supply :- deep temporal br. of mandibular nerve. (ant. division)
- Action :- elevate mandible (by ant. & sup. fibers) & retract the mandible (by post. fibers).

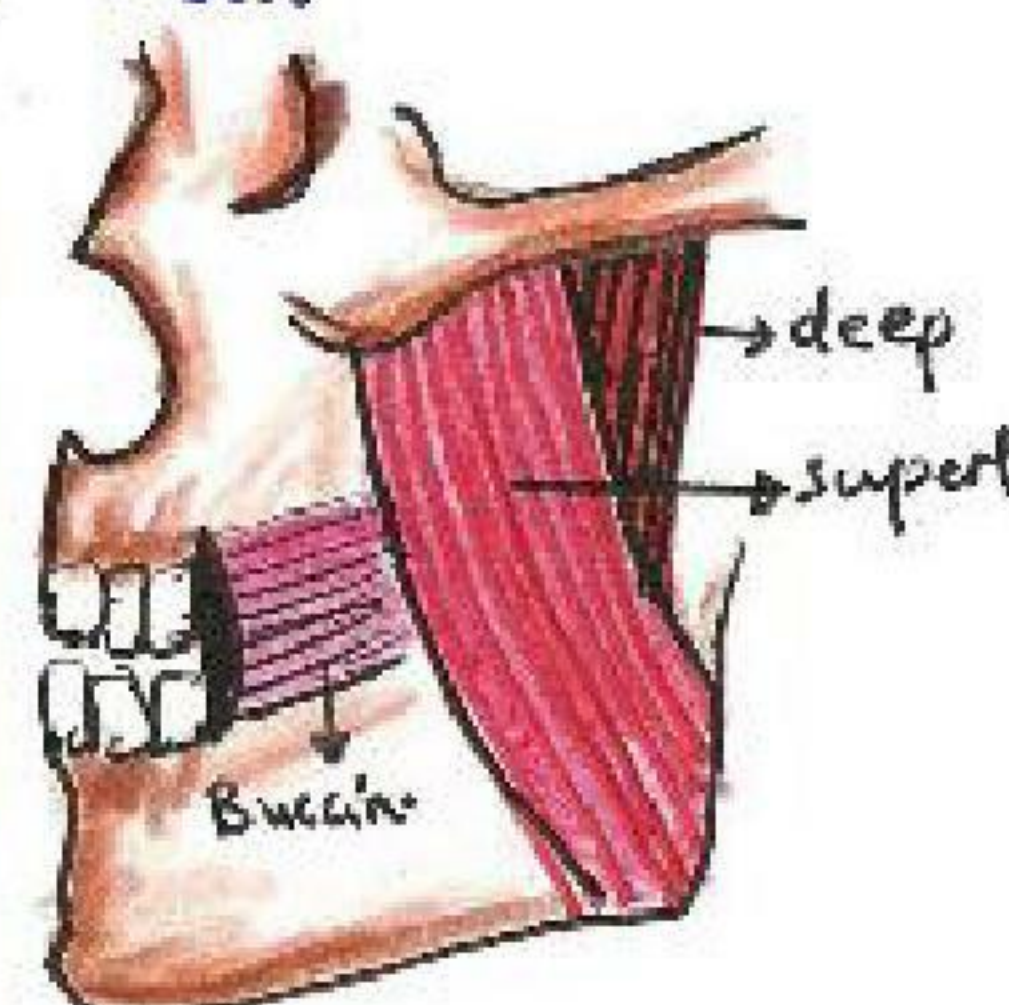
* MASSETER :-

- origin :- Zygomatic arch (lower border & medial surface). ^{superf. fibers}
- insertion :- ramus of mandible (outer aspect). ^{deep fibers}
- N./supply :- mandibular division of trigeminal nerve. (ant. division)
- Action :- elevate mandible & protrude it. (antigravity ms).
↳ by superficial fibers

- Masseter has superficial fibers that pass obliquely down ward & backward & deep fibers vertically downward

* Relation of masseter

- deep :- Buccinator, buccal N., buccal pad of fat.
- superf. :- parotid gland & duct, facial N. br., transv. facial artery.



*MEDIAL PTERYGOID :-

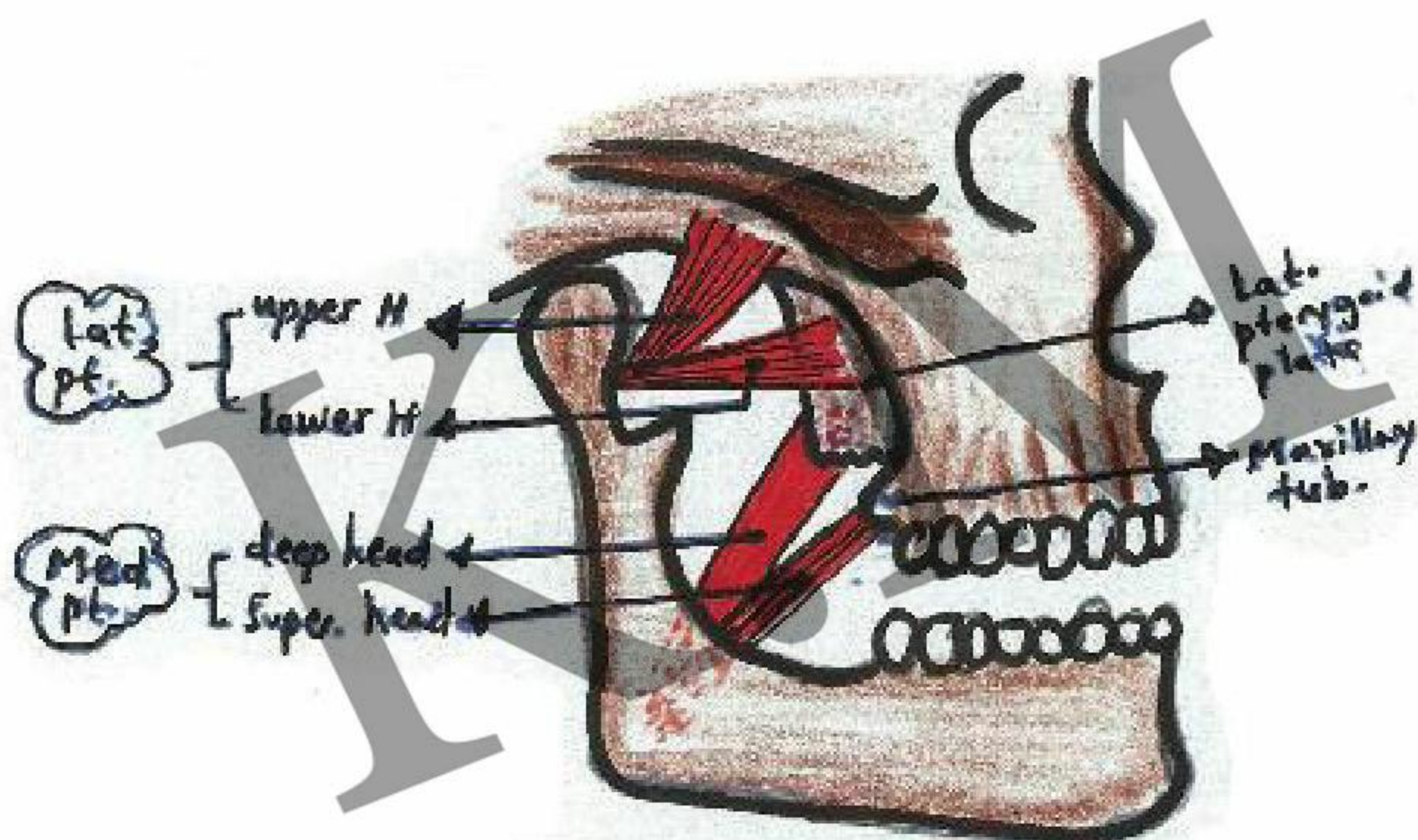
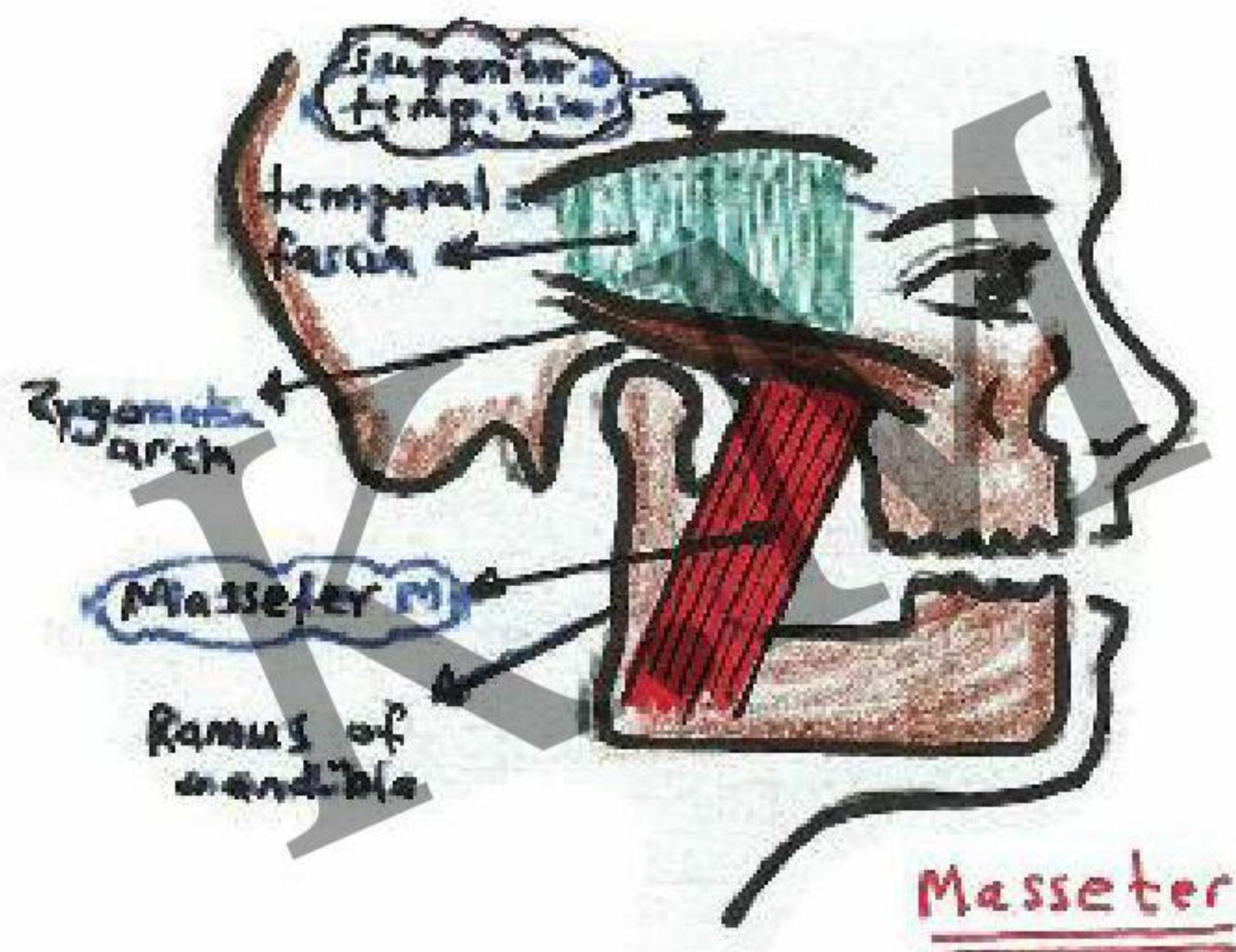
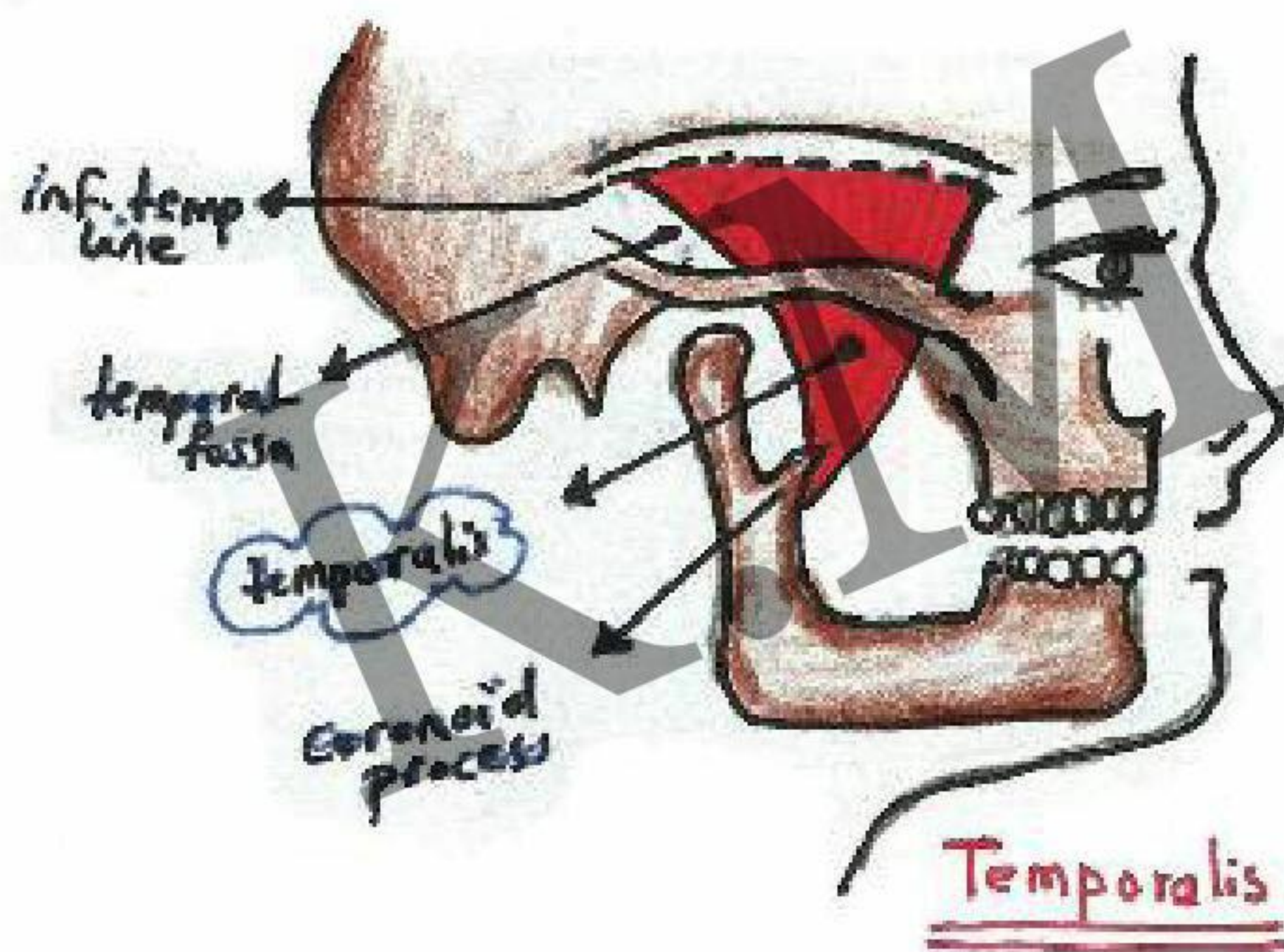
- **Origin:**
 - superf. head :- Maxillary tuberosity.
 - deep head :- lateral pterygoid plate (medial surface).
- **Insertion:** angle of mandible (medial surface).
- **N. supply:** mandibular division of trigeminal N. (~~ent.~~ trunk).
- **Action:**
 - elevation & protraction of mandible
 - side to side (chewing) movement.

*LATERAL PTERYGOID :-

- **Origin:**
 - upper head :- greater wing of sphenoid (infratemporal surface).
 - lower head :- lateral pterygoid plate (lateral surface).
- **Insertion:** pterygoid fovea (front of neck of mandible) & articular disc of temporomandibular joint. (TMJ)
- **N. supply:** mandibular division of trigeminal N. (ent. division).
- **action:**
 - depression & protraction of TMJ (pulling neck & disc forward)
 - side to side movement.

APPLIED ANATOMY :-

- Excessive contraction of lat. pterygoid (as in yawning or large bite) can cause mandibular condyle dislocation.
- Mandibular N. paralysis → causes jaw deviation to paralysed side (pushed by normal lat. pterygoid ms of opposite side) and tested by clenching patient teeth → soft ms.



Med. & Lat. pterygoid ms.

MANDIBULAR NERVE

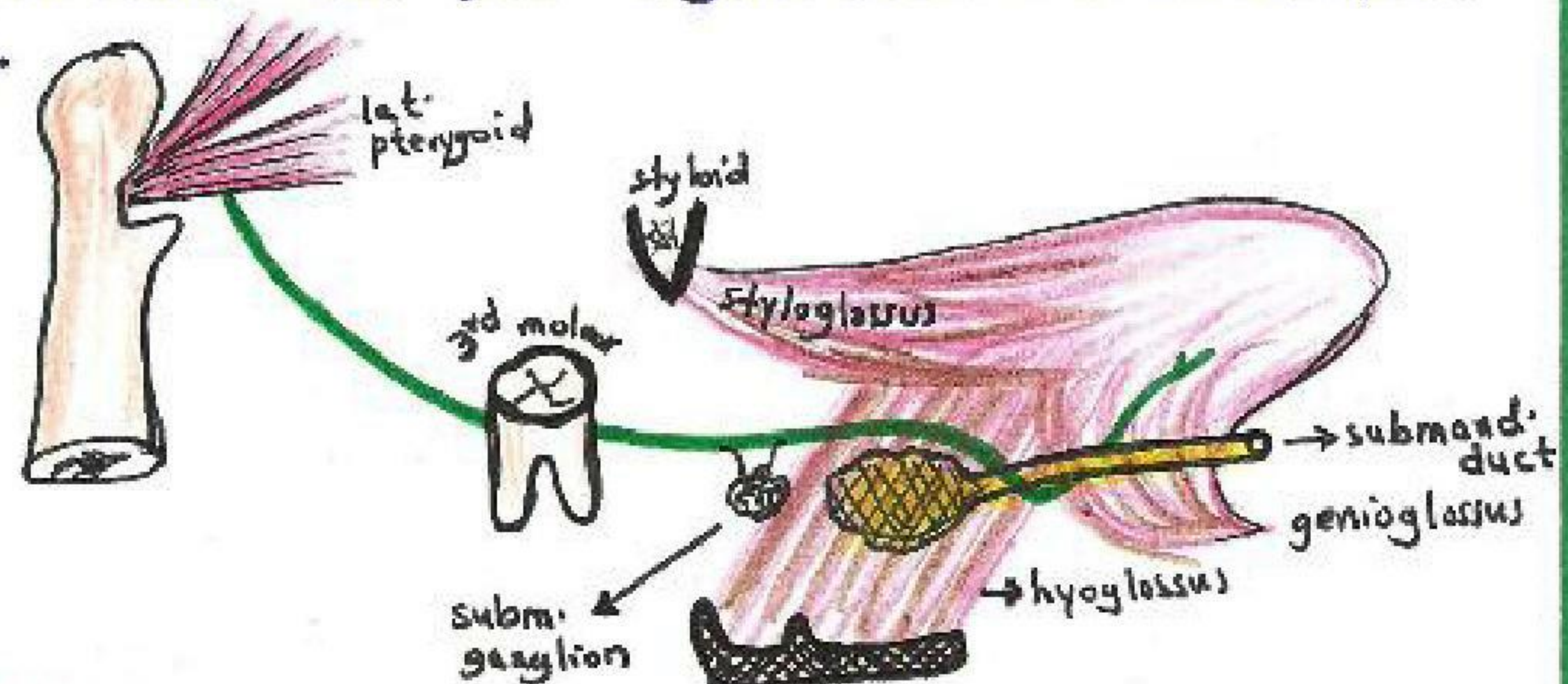
- **Origin** :- the largest of the 3 divisions of trigeminal nerve.
 - It has large sensory root from trigeminal ganglion & small motor root from ^{trig.} motor nucleus in Pons
 - both roots joined ^{below} in foramen ovale forming trunk.
 - It is the nerve of 1st branchial ^{arc}ch.
- **Course** :- emerge from foramen ovale (in greater wing of sphenoid)
 - mandibular trunk enter infratemporal fossa between tensor veli palatini & otic ganglion (medially) and lateral pterygoid (laterally).
- **End** :: divides into ant. & posterior divisions (ant → small, post → large)
- **Branches** :: [A] From main trunk :: (15.1m)
 - ① (sensory): meningeal br. (Nervus spinosus) → enters F. spinosum to supply dura matter in middle cranial fossa.
 - ② (motor): nerve to medial pterygoid → supplies Med. pt. & pass through otic ganglion (without interruption) to give 2 branches supplying Tensor tympani & Tensor palatini
- [B] From ant. division :: (3m. 1s)
 - ① (Motor): deep temporal N. (to temporalis)
 - ② ("): Masseteric (to masseter).
 - ③ ("): nerve to lateral pterygoid.
 - ④ (sensory): buccal (to skin & mm. of cheek) [Not buccinator]
Passes between 2 heads of lat. pterygoid.
- [C] From Post. division :: (3s. 1m).
 - ① (sensory): auriculotemporal nerve.
 - ② ("): Lingual nerve
 - ③ ("): inferior ^{inf.} alveolar nerve
 - ④ (motor): nerve to mylohyoid also supply anterior belly of digastric muscle.

* Auriculo temporal nerve :-

- arise by 2 roots around middle meningeal artery (runs medial to neck of mandible)

* Lingual nerve :-

- descends downward & medially under lat. pterygoid muscle
- enters mouth close to inner surface of 3rd molar tooth (dangerous position.) "ie 3rd molar lateral to nerve"
- Passes above styloglossus, hyoglossus & genioglossus deep to mylohyoid.
- submandibular ganglion hang from it, and then crosses & hooks around submand. duct (lat, below & medial)
- It carries general sensation from ant. 2/3 of tongue (taste sensation from ant 2/3 by chorda tympani "branch of facial nerve" that joins lingual nerve in infratemporal fossa).



* Inferior alveolar N. :-

- enters mandibular canal with inf. alveolar artery to supply teeth of lower jaw as a plexus & merge through mental foramen as mental nerve to supply skin of chin, skin & m.m. of lower lip & vestibular gingiva of mandibular ^{teeth} incisor

- * **NB** - N. to mylohyoid is a small branch from inf. alveolar N. before the nerve enters the mandibular canal, it supplies mylohyoid & ant. belly of digastric. it runs in mylohyoid groove on medial surface of mandible.

MAXILLARY NERVE

- It is the 2nd division of trigeminal nerve.
- It is purely sensory nerve.
- It arises from trigeminal ganglion.

* Course :-

- It passes in lower part of lateral wall of cavernous sinus & leaves cranial cavity through foramen rotundum to enter the pterygopalatine fossa then enter inf. orbital fissure to become infraorbital nerve which passes through infra-orbital canal & reach the face by passing through infra-orbital foramen to give terminal branches in face i.e. [Palpebral, nasal & orbital]

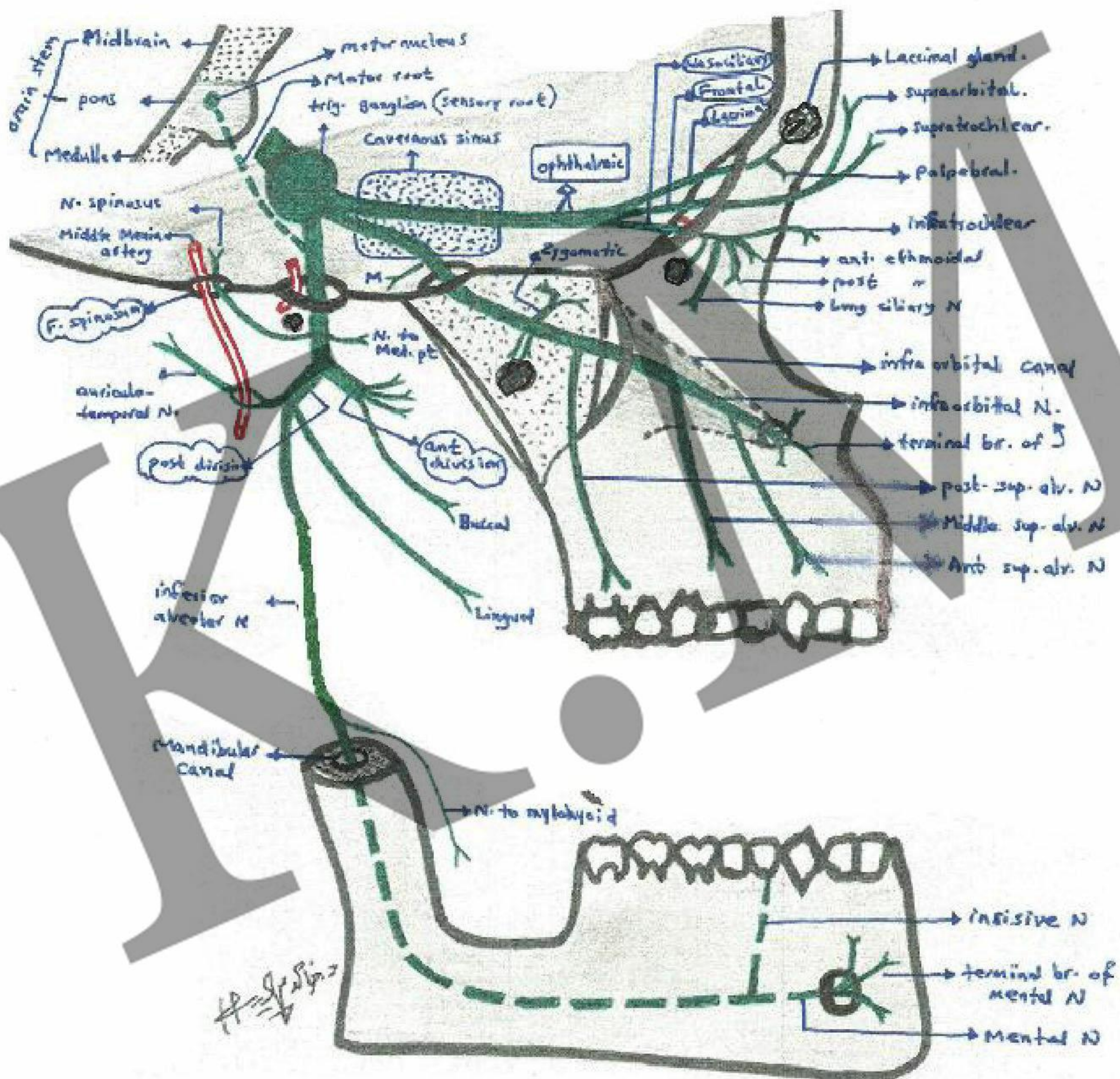
* Branches :-

- ① Meningeal branch: → arise inside cranial cavity.
 - ② two ganglionic br. to sphenopalatine ganglion
 - ③ Zygomatic n. (gives Z. temporal & Z. facial)
 - ④ Posterior superior alveolar nerve
 - ⑤ Infra-orbital nerve which gives :-
 - a. Middle sup. alv. nerve.
 - b. Anterior " " "
 - c. terminal branches → (palpebral, nasal & labial)
- } → arise in the pterygopalatine fossa

OPHTHALMIC NERVE

- the 1st br. of trigeminal, pure sensory (arise from trig. ganglion)
- Passes forward in lateral wall of cavernous sinus.
- It is divided into 3 branches (L.F.N) that enter orbit through superior orbital fissure → see orbit.

- * Branches :-
- ① Lacrimal: gives → ① Palpebral, ② N. to lacrimal gland.
 - ② Frontal: → ① supra-trochlear ② supra-orbital.
 - ③ Nasociliary: → ① infra-trochlear ② N. communicating to ciliary ganglion
 - ③ long ciliary N. ④ ant. ethmoidal N.
 - ⑤ Post. ethmoidal.



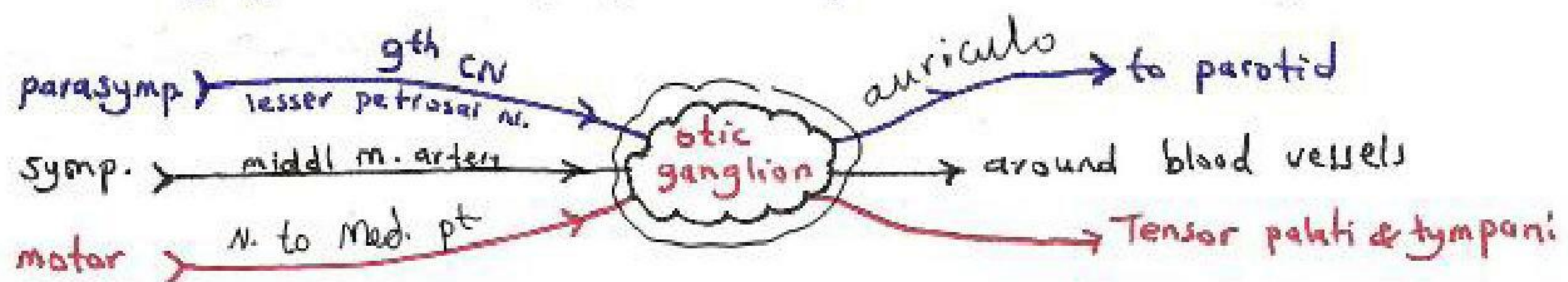
**Trigeminal nerve
(mandibular)**

OTIC GANGLION :-

- Parasympathetic ganglion supplying parotid gland.
- Lies just below foramen ovale, medial to mandibular nerve & lateral to tensor Palati (adherent to N. to medial pterygoid).

*Roots & branches :-

- ① Parasympathetic root :- comes from inf. salivary nucleus of the glossopharyngeal nerve (9th CN) which gives → tympanic branch to tympanic plexus (in middle ear) which gives → lesser petrosal nerve (pass through F. ovale) to otic ganglion.
- Post ganglionic fibers reach parotid through auriculo temporal N.
- ② Sympathetic :- from fibers around middle meningeal artery from superior cervical ganglion pass through otic ganglion without relay.
- ③ motor root :- from nerve to medial pterygoid pass through otic ganglion to supply tensor palati & tensor tympani.



PTERYGOID V. PLEXUS :- see Page ⑨

- Venous network associated with pterygoid muscles.
- tributaries are (16 veins) Corresponds to the branches of maxillary artery. "page 22"

MAXILLARY ARTERY :-

* Beginning :- largest terminal branch of external carotid artery.
at level of neck of mandible ^{behind} inside parotid gland.

* End :- continues as infraorbital artery at inferior orbital fissure.

* Parts :- divided into 3 parts by lat. pterygoid muscle

- 1st part (mandibular): medial to neck of mandible.
- 2nd (muscular Pterygoid) part: Passes upward & forward either medial or lateral (superf.) to lower head of lateral pterygoid
- 3rd (pterygopalatine) part: enters pterygopalatine fossa through pterygo palatine (pterygomaxillary) fissure.

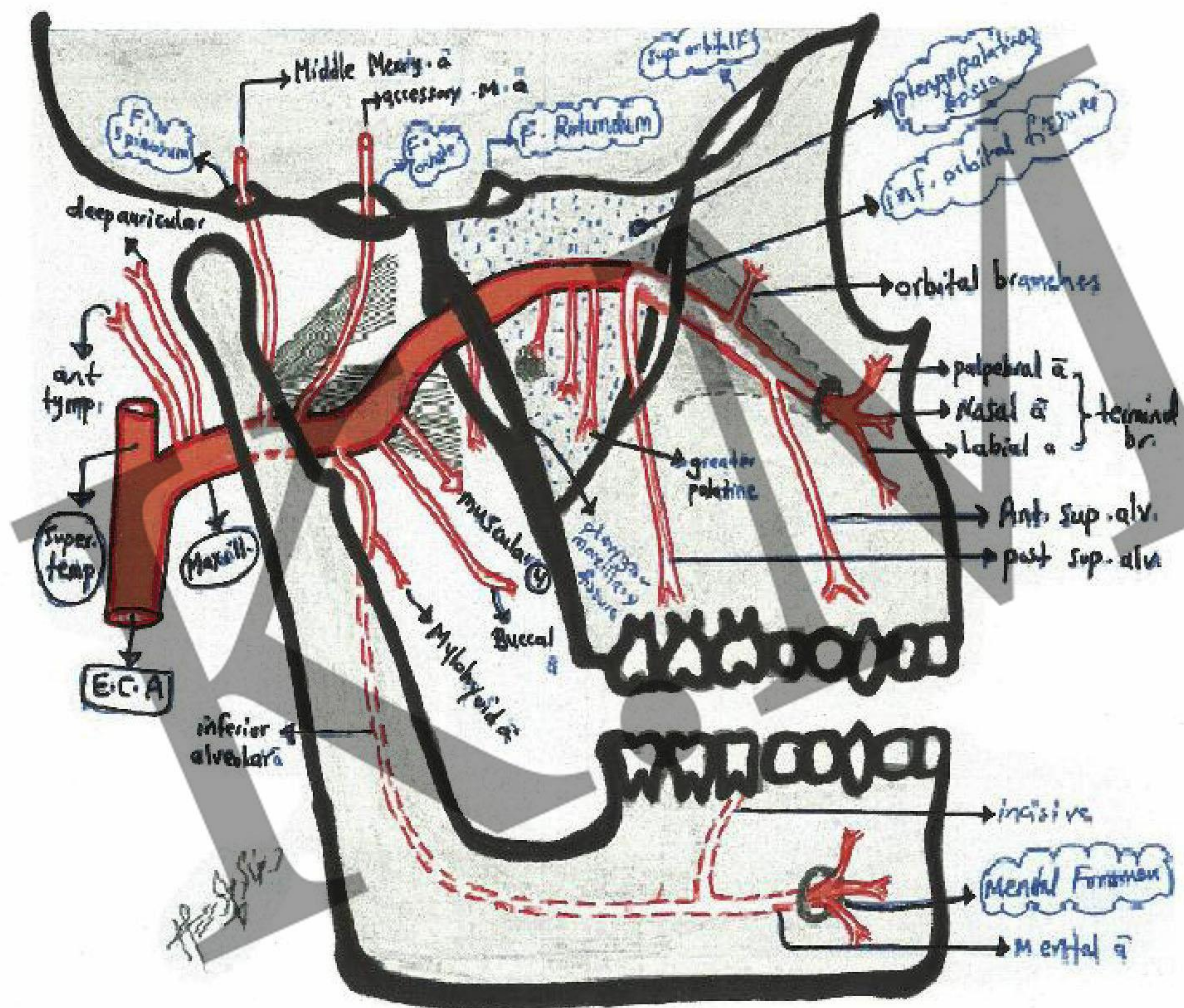
* Branches :-

- First Part :-
 - ① Middle meningeal artery → Pass through F. ^{spinosum} ~~ovale~~ behind mand. N.
 - ② Accessory meningeal → ascend through F. ovale
 - ③ deep auricular → to skin of ext. auditory meatus & tympanic membrane (outer surface)
 - ④ Anterior tympanic → to inner surface of tympanic membrane (anastomose with stylomastoid & that gives post. tympanic artery)
 - ⑤ inferior alveolar.
- Second Part :-
 - ① deep temporal arteries (2) → to temporalis.
 - ② Masseteric artery → to masseter (Pass through mand. notch).
 - ③ artery to medial pterygoid.
 - ④ artery to lateral pterygoid.
 - ⑤ Buccal artery → to Buccinator
- Third part :-
 - ① pharyngeal branch → to nasopharynx (through Palatovaginal ^{canal})
 - ② sphenopalatine artery → to nasal cavity & palate (by sphenopalatine ^{foramen})
 - ③ Greater palatine artery → it gives lesser palatine artery to soft ^{palate}
 - ④ artery to pterygoid canal → to nasopharynx.
 - ⑤ Posterior sup. alveolar artery → to maxillary sinus, molar & premolar ^{teeth}
 - ⑥ Infraorbital artery

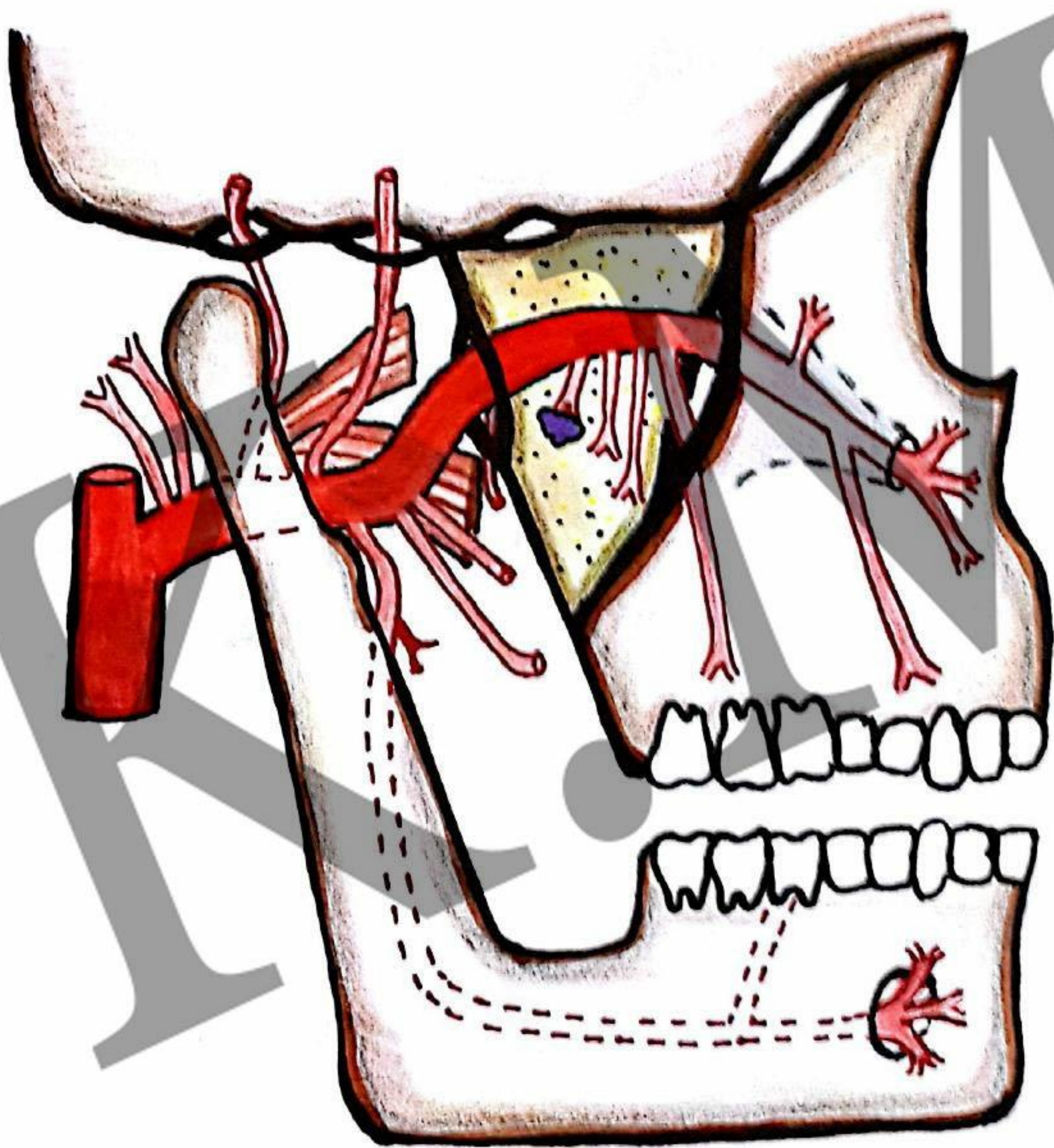
[NB] - Inf. alveolar artery: follows inf. alveolar nerve into mandibular canal giving branches to molar, premolar & incisive artery to canine & incisive teeth. , also gives mylohyoid artery.

- It continues as mental artery that merge through mental foramen

[NB] - Middle meningeal a :- Pass between 2 roots of auriculotemporal N. enters F. spinosum & after 2 cm give 2 branches (ant. & post) that grooves the bone in middle cranial fossa.



Maxillary artery



TEMPORO-MANDIBULAR Joint . TMJ .

* ARTICULATION :-

- Above :- mandibular fossa of temporal bone (& articular tubercle).
- below :- head (condylar process) of mandible.
- Articular disc :- oval plate of fibrocartilage.
 - divides joint into upper & lower cavities.
 - has upper surface concavo-convex (from before backward) and lower surface concave.
 - attached to capsule & in front to lat. pterygoid & head of mandible.

* TYPE :-

- synovial condyloid joint. (some says ellepsoid)

* CAPSULE :-

- attached to margins of articular surfaces & lined by syn. membrane.

* LIGAMENTS :-

- ① Lateral ^(Temporomand) T.M. ligament :- from Zygoma tubercle to neck of mandible ^(lateral side).
- ② Sphenomandibular lig :- from spine of sphenoid to ^(medial side) lingula of the mandibular foramen [it represents remains of 1st pharyngeal arch].
- ③ Stylo-mandibular lig. :- from styloid process to angle of mandible lies behind & medial to TMJ [it is a thick deep fascia].

* NERVE SUPPLY :-

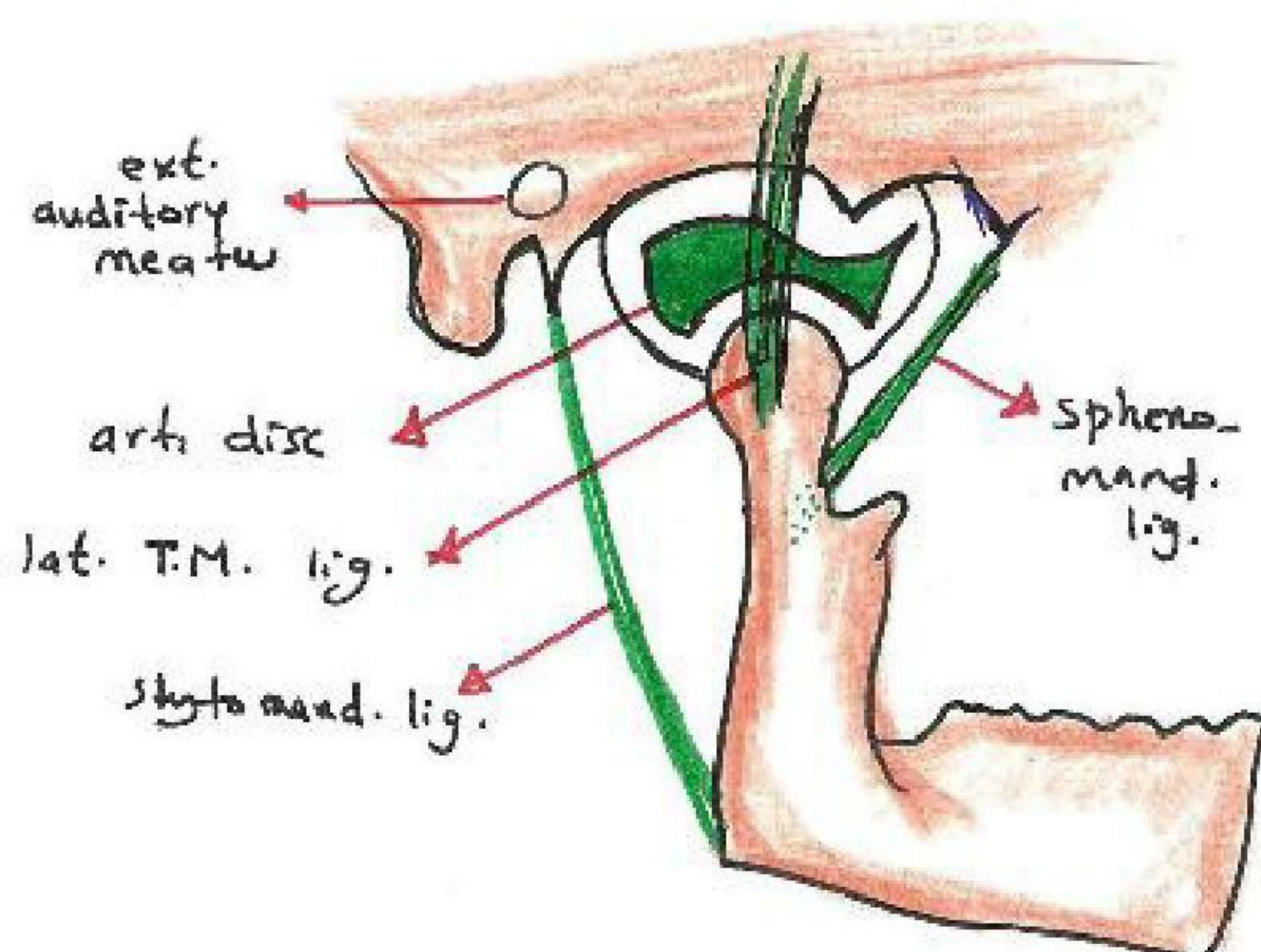
- branches of mandibular nerve [auriculotemporal & masseteric br.].

* MOVEMENTS :-

- Depression :- lat. pterygoid & suprahyoid muscles.
- Elevation :- masseter, med. pterygoid & temporalis.
- Protraction :- " " " & lateral pterygoid.
- Retraction :- temporalis (post. fibers).
- Side to side (chewing) :- med. & lateral pterygoid.

* RELATIONS :-

- Anterior :- mandibular notch & masseteric Nerve & vessels.
- Posterior :- tympanic plate of temporal bone & ^{glenoid} Part of parotid gland
- Lateral :- parotid gland, fascia & skin.
- Medial :- Maxillary vessels, auriculotemporal nerve.



THE NECK

*EXTENTION :-

- above :- lower margin of mandible & superior nuchal line of occipital bone.
- below :- suprasternal notch & upper border of clavicle.

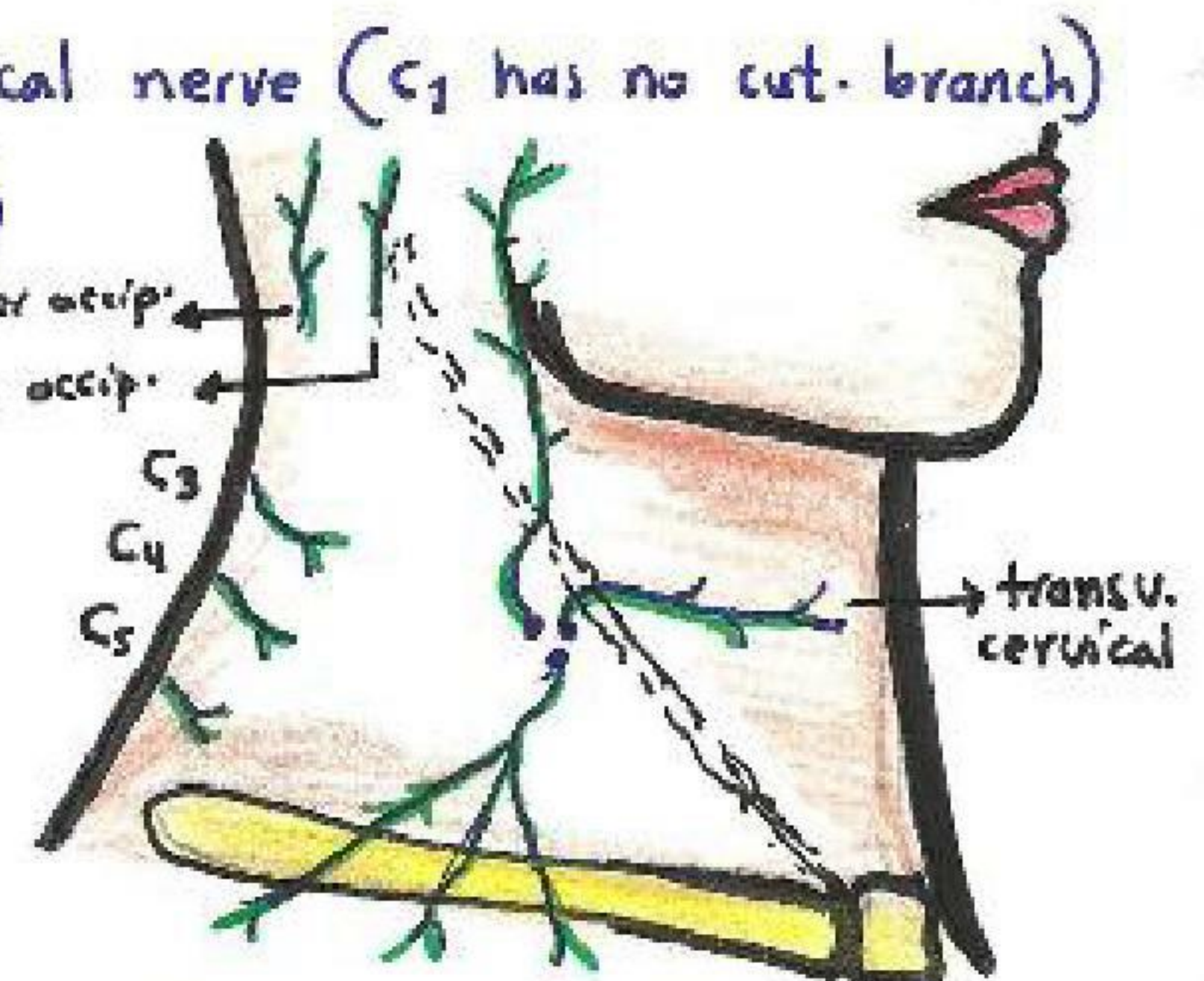
SKIN

*Skin of back of neck :-

- supplied segmentally by dorsal rami of cervical nerve (C_1 has no cut. branch)
- ① greater occipital nerve (post. ramus of C_2)
- ② dorsal rami of C_3 , C_4 & C_5

*Skin of anterolateral aspect :-

- supplied by ant. rami of cervical nerves by cervical plexus that emerge from beneath post. border of sternomastoid muscle.



- ① transverse cut. nerve ($C_{2,3}$) :- supplies skin anterolaterally from sternum to body of mandible.
- ② supraclavicular nerve ($C_{3,4}$) :- supplies skin up to level of 2nd rib. it gives 3 branches (medial, lateral & intermediate branches).
- ③ Greater auricular nerve ($C_{2,3}$) :- supplies skin over angle of mandible, parotid gland, on both surfaces of auricle.
- ④ lesser occipital nerve (C_2) :- hooks around the accessory nerve, it supplies skin over occipital region & medial side of auricle.

SUPERFICIAL FASCIA

*CONTENTS :-

- 1- platysma muscle.
- 2- superficial cutaneous nerves (supplying the skin).
- 3- superficial veins (external jugular, anterior jugular & jugular arch).
- 4- superficial lymph nodes :- sup. cervical lymph nodes.

PLATYSMA M_s :-

***ORIGIN** :- from deep fascia covering upper part of pectoralis major & deltoid muscles

***Insertion** :- base of mandible and angle of mouth

***Action** :- depression of mandible & angles of mouth

***N/S** :- facial nerve (cervical branch).



EXTERNAL JUGULAR VEIN :-

***Beginning** :- begins ^{behind} below angle of mandible by union of post. auricular vein with post. division of retromandibular vein

***End** :- subclavian vein (just above middle of clavicle).

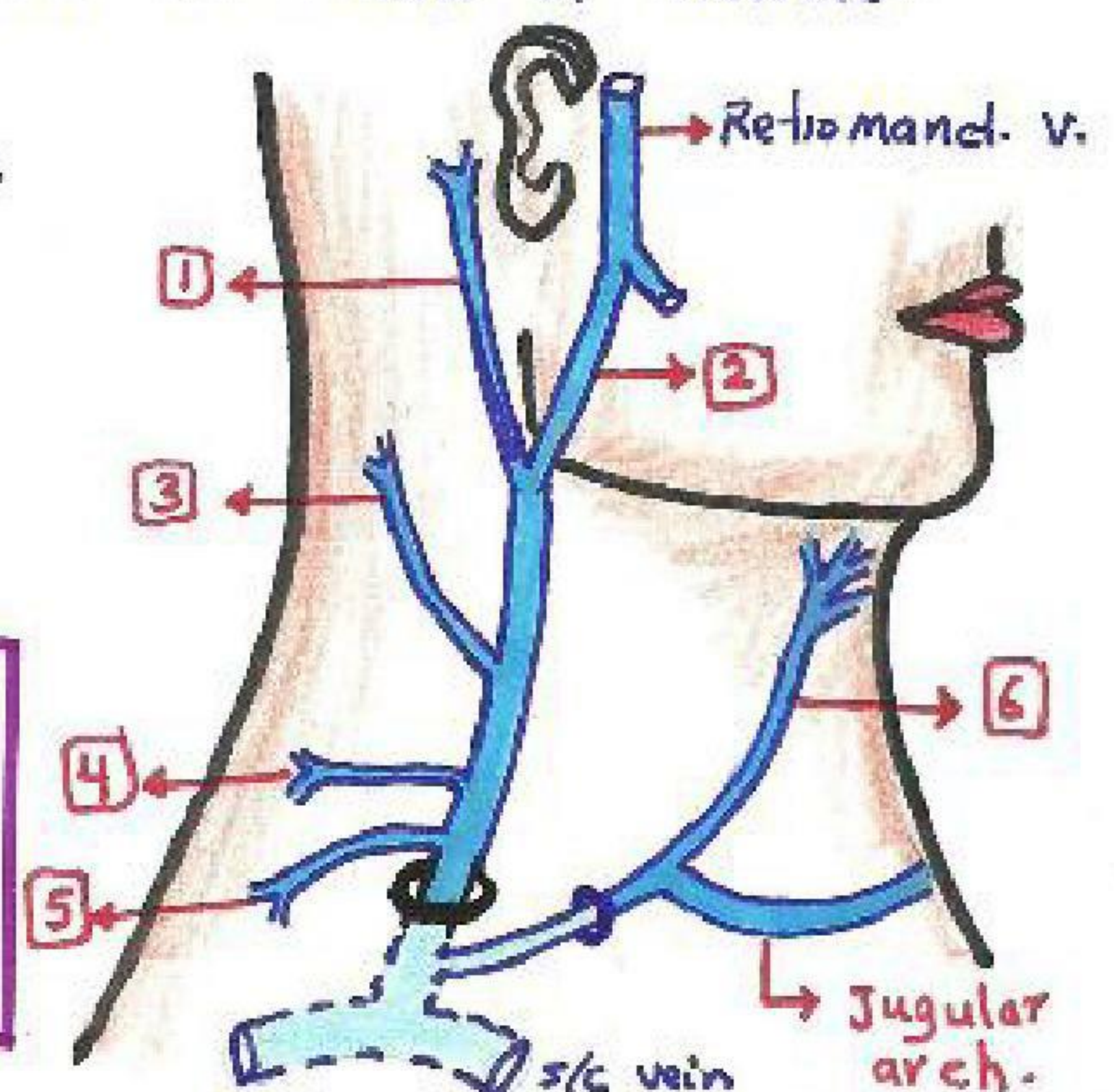
***Course & relation** :- runs downward obliquely superficial to sterno-mastoid & pierces deep fascia in post. Δ of neck (inch above clavicle)

***Surface anatomy** :- from angle of mandible to middle of clavicle.

- *Tributaries** :-
- ① Post. auricular vein
 - ② Post. division of retromand. v.
 - ③ Post. external jugular v.
 - ④ Transverse cervical v.
 - ⑤ Suprascapular v.
 - ⑥ ant. jugular v.

NB :- ant. jugular vein start under chin from submental plexus of veins & joined to the other side by jugular arch (above sternum)

NB :- Post. ext. jug. drains into ext. Jugular about halfway it's course



DEEP FASCIA OF NECK

- Consists of areolar tissue that supports ms, vessels & viscera of neck.
- Condensed in some areas to form 4 layers :-
 - ① Investing layer.
 - ② Pretracheal layer
 - ③ Prevertebral layer.
 - ④ Carotid sheath.

I- INVESTING LAYER :-

- Completely encircles the neck (like a collar) forming roof of the ant. & post. triangles of neck & splits to enclose the sterno-mastoid & trapezius muscles.

* Attachment :-

- Posteriorly :- to Ligamentum nuchae.
- Inferiorly :- to manubrium, clavicle, acromion & spine of scapula.

NB:- above manubrium it splits into 2 layers attached to manubrium & between the 2 layers there is suprasternal space contains jugular arch.

NB:- above clavicle it splits into 2 layers where the post. layer encloses inf. belly of omohyoid, binds it to clavicle

- Superiorly :- attached to lower border of mandible & hyoid then splits to enclose the parotid (forming capsule to it) then attach to mastoid process, sup. nuchal line & ext. occipital protuberance.

NB:- when enclosing parotid gland the outer layer attached to zygomatic arch & inner layer to base of skull

NB:- between angle of mandible & styloid process it thickens to form stylomandibular ligament.

II- PRETRACHEAL FASCIA

* Attachment :- (It lies deep to infrahyoid ms.)

- above :- to hyoid bone, thyroid cartilage (splits to enclose ^{& Parathyroid} thyroid gland)
- below :- extends to thorax to blends with fibrous pericardium.
- laterally :- on each side blends with carotid sheath & investing layer.
- It also invests the infrahyoid muscles.

III: PREVERTEBRAL FASCIA :-

- Covers the prevertebral muscles (longus capitis & longus cervicis).

*attachment:-

- Posteriorly :- ligamentum nuchae
- Superiorly :- base of the skull.
- Inferiorly :- enters thorax & blends with ant. longitudinal lig. of the vertebral column.

• **[NB]** Prevertebral fascia forms the floor of post. triangle of neck

• **[NB]** Retropharyngeal space :- interval bet. pharynx & prevertebral fascia

• **[NB]** Axillary sheath :- Prolongation of prevertebral fascia that contains brachial plexus & axillary artery.

IV: CAROTID SHEATH :-

- It is a tubular condensation of deep fascia

*attachment:-

- above :- to base of skull (around carotid & jugular foramina).
- below :- blends with adventitia of arch of aorta.
- anteriorly :- continuous with pretracheal fascia.
- Posteriorly :- continuous with Prevertebral fascia.

*contents:-

• In the upper part :- (above Post. belly of digastric).

1- I.C.A (anteromedially)

2- I.J.V (Posterolaterally)

3- the lower 4 cranial nerves (9, 10, 11 & 12 → between ICA & IJV).

• In the lower part :-

1- C.C.A (anteromedially)

2- I.J.V (posteromedially)

3- Vagus nerve (10th CN)

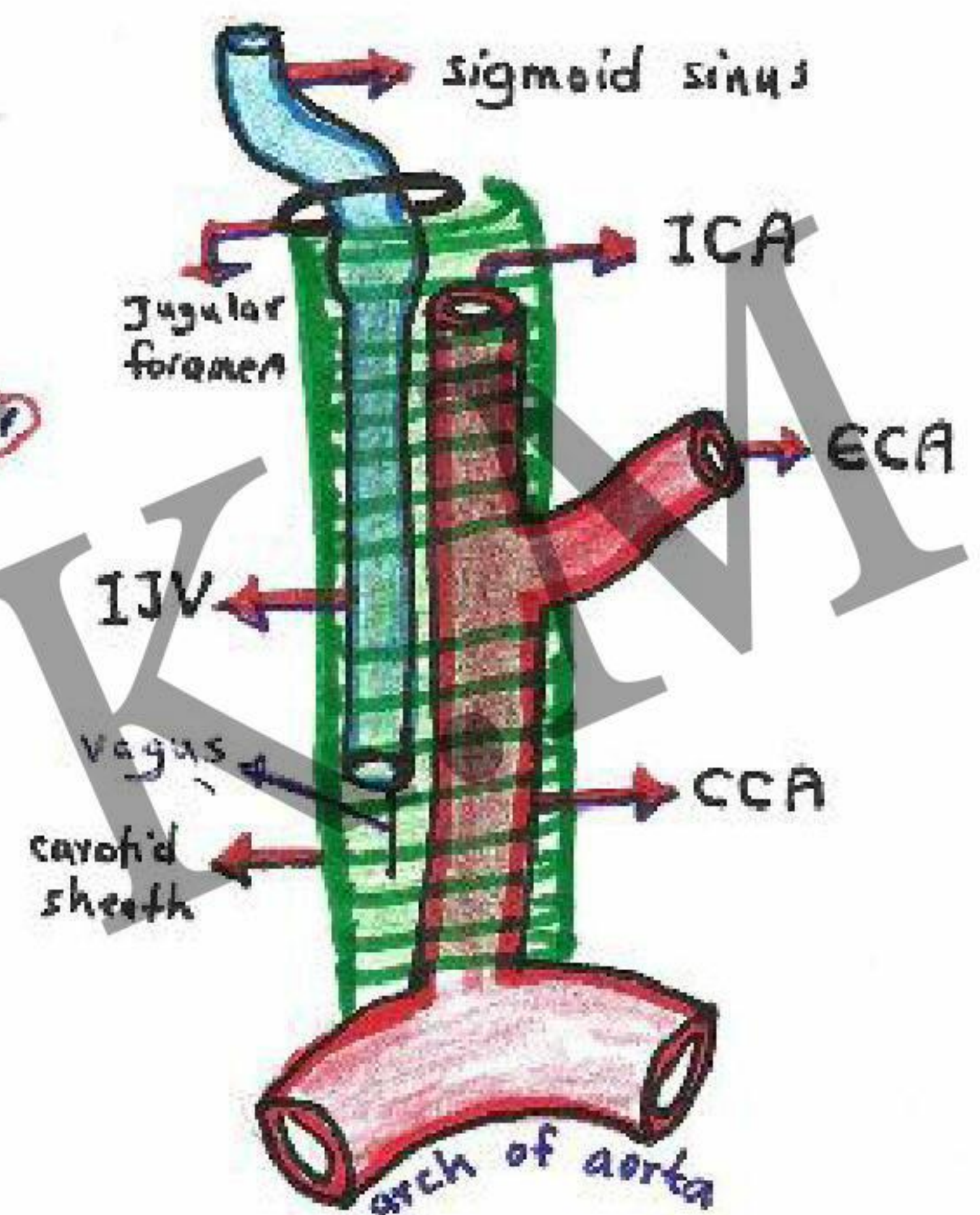
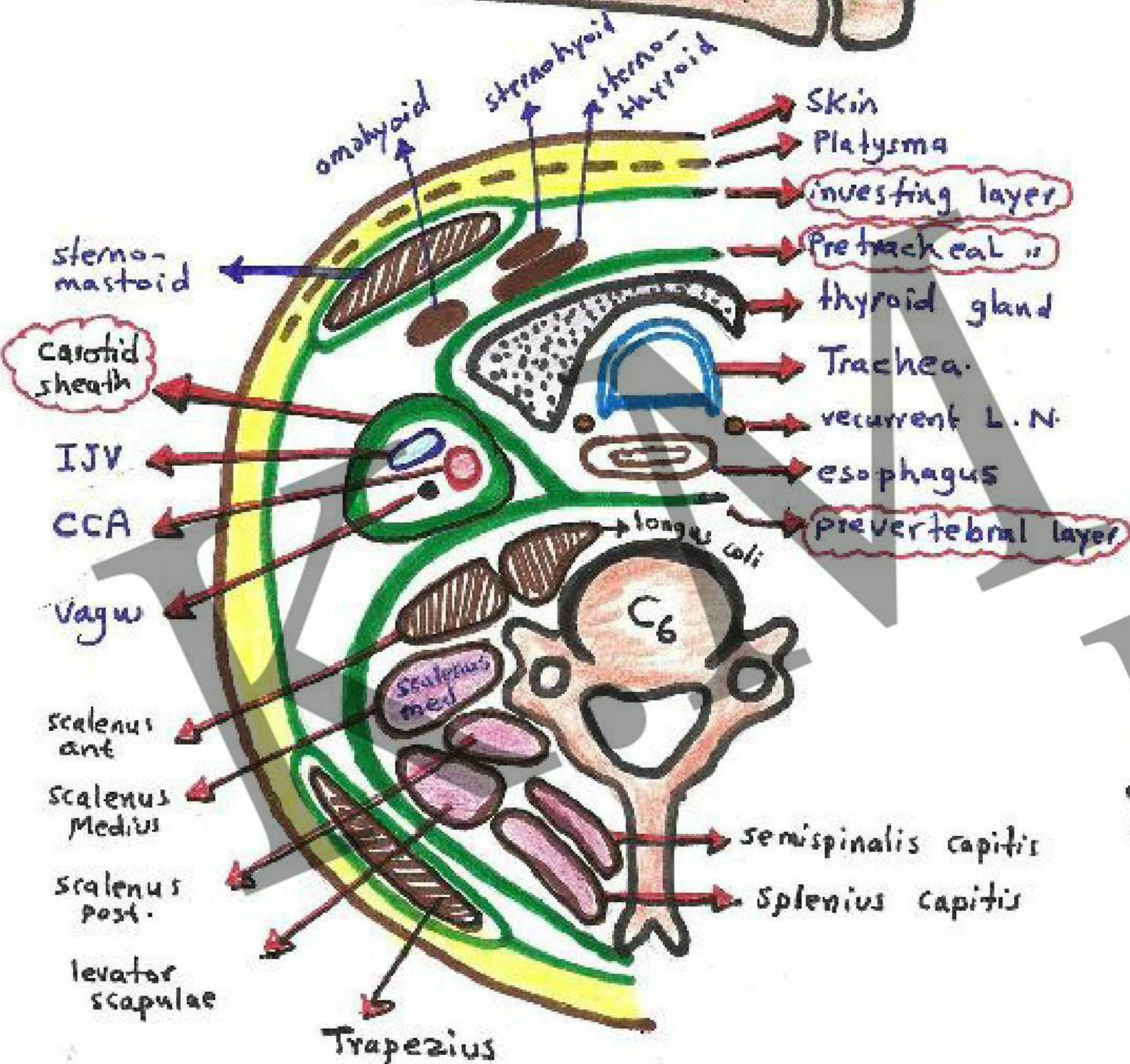
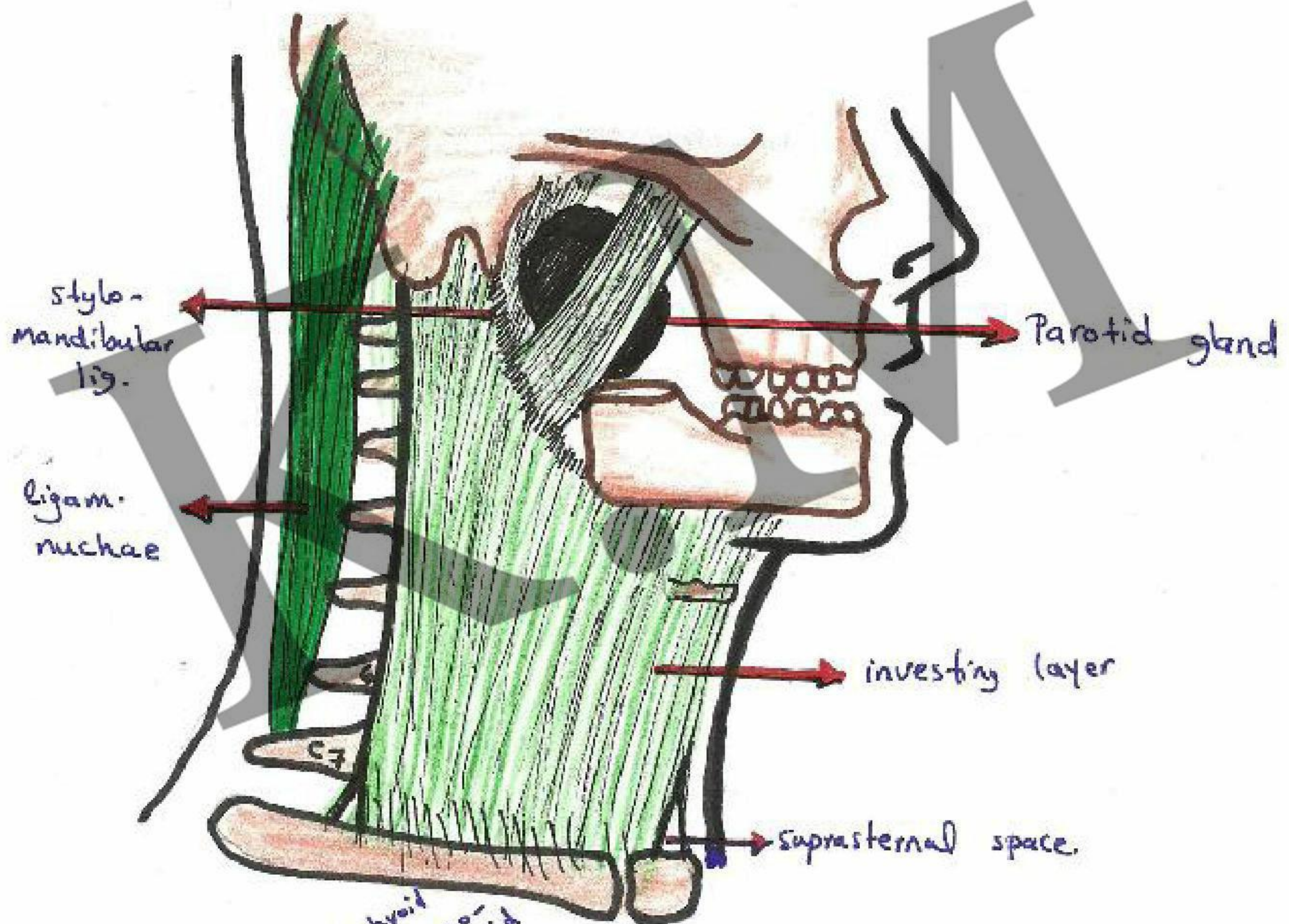
(deep cervical LN forms chain around IJV)

*Relations:-

• Superficial :- skin, fascia, sternomastoid, styloid apparatus, parotid gland post. belly of digastric, deep cervical LN.

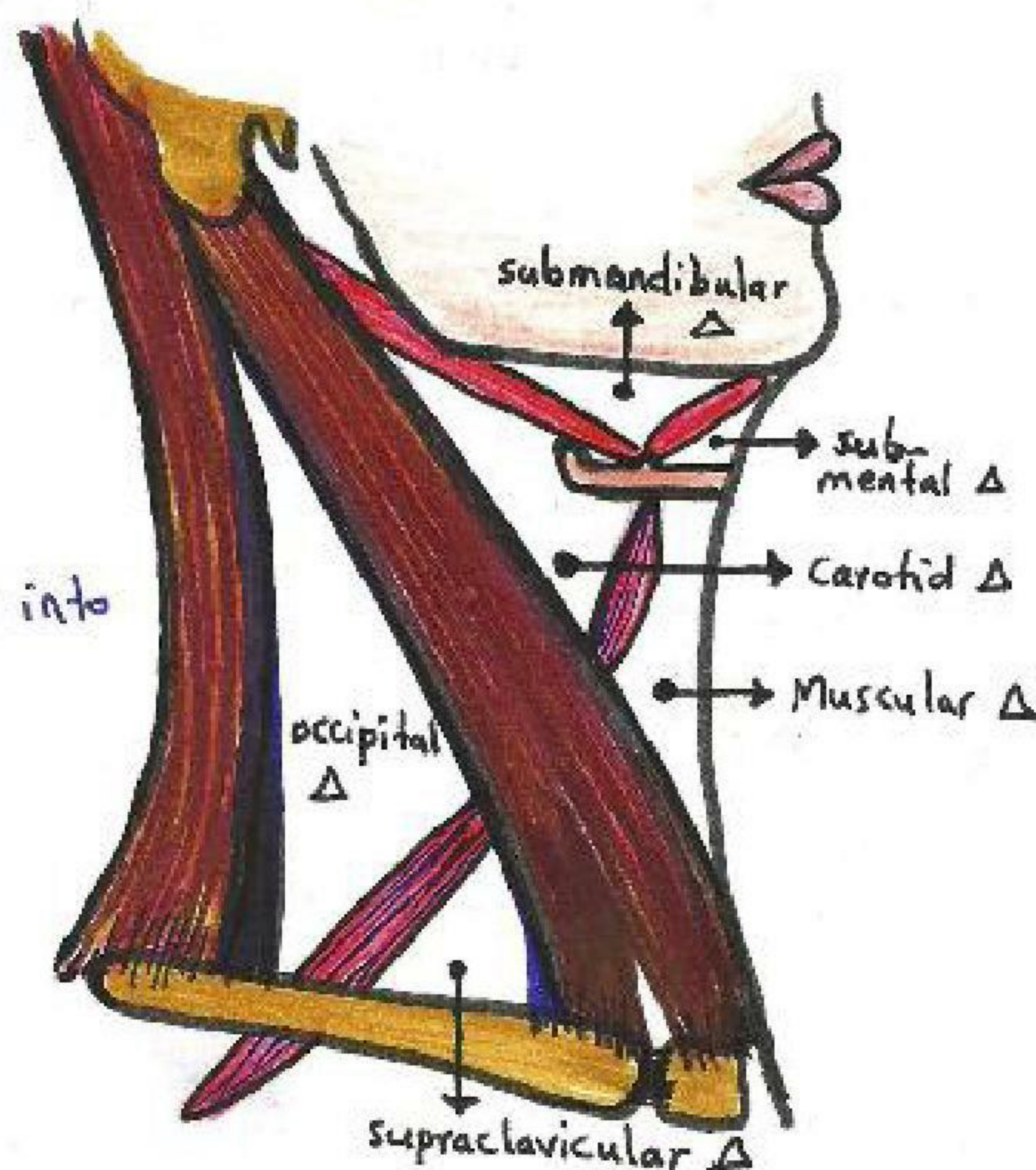
• deep relation :- cervical vertebrae (transv. process), cervical plexus of nerves lat. & pre-vertebral ms & 1st part of subclavian a.

DEEP FASCIA OF NECK



TRIANGLES OF NECK

- The muscles of the neck are arranged to form triangles which are anterior, posterior & suboccipital triangles.
- The anterolateral aspect of neck is divided by sternomastoid ms into ant. & post. Δ .
- The post. Δ is divided by the inferior belly of omohyoid into
 - ① supraclavicular Δ .
 - ② occipital Δ .
- The ant. Δ is divided by the sup. belly of omohyoid & digastric ms into
 - ① submental Δ . ($\frac{1}{2}$).
 - ② submandibular (digastric) Δ .
 - ③ carotid Δ .
 - ④ muscular Δ .



POSTERIOR Δ

* BOUNDARIES :-

- Anteriorly :- Post. border of sternomastoid ms.
- Posteriorly :- ant. border of trapezius ms.
- Inferiorly :- middle third of clavicle.

apex: meeting of sternomastoid & trapezius.

* ROOF OF Δ :-

- Skin, superficial fascia, platysma, deep fascia (investing layer). ^{supra-clavicular nerve.}

* FLOOR OF Δ :-

- Semispinalis capitis, splenius capitis, levator scapulae, scalenus anterior (usually hidden by sternomastoid) & scalenus medius.
- the muscles in floor are covered by prevertebral fascia.

CONTENTS OF POST. Δ :-

- ① Muscle: → inferior belly of omohyoid. (LN)
- ② Veins: → E.J.V & subclavian vein
- ③ Nerves: → spinal part of accessory nerve.
 - trunks of brachial plexus (upper, middle & lower).
 - cutaneous branches of cervical plexus
 - supraclavicular
 - transv. cervical
 - great auricular
 - lesser occipital
- ④ Arteries → ① transverse cervical a. ③ occipital a (3rd part).
 ② suprascapular a ④ subclavian a (3rd part).

SUB-OCCIPITAL Δ

* BOUNDARIES :-

- Medially :- rectus capitis post. major & minor. (RCPM_J, RCPM_n)
- Above & laterally :- sup. oblique (obliquus capitis sup.)
- below & laterally :- inf. " (" " inf.).

* ROOF :-

- semispinalis capitis & longissimus capitis

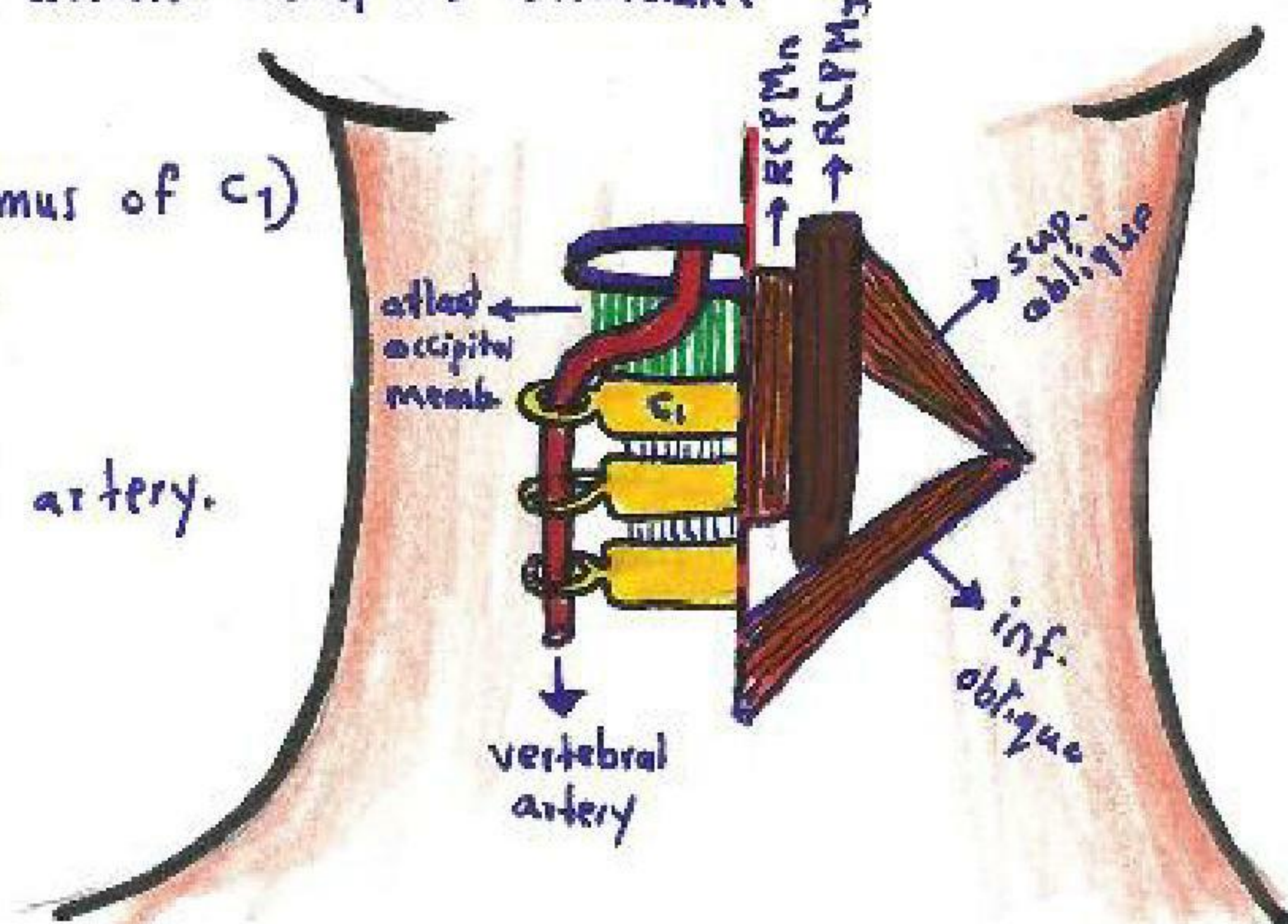
* FLOOR :-

- post. arch of atlas & post. atlanto-occipital membrane

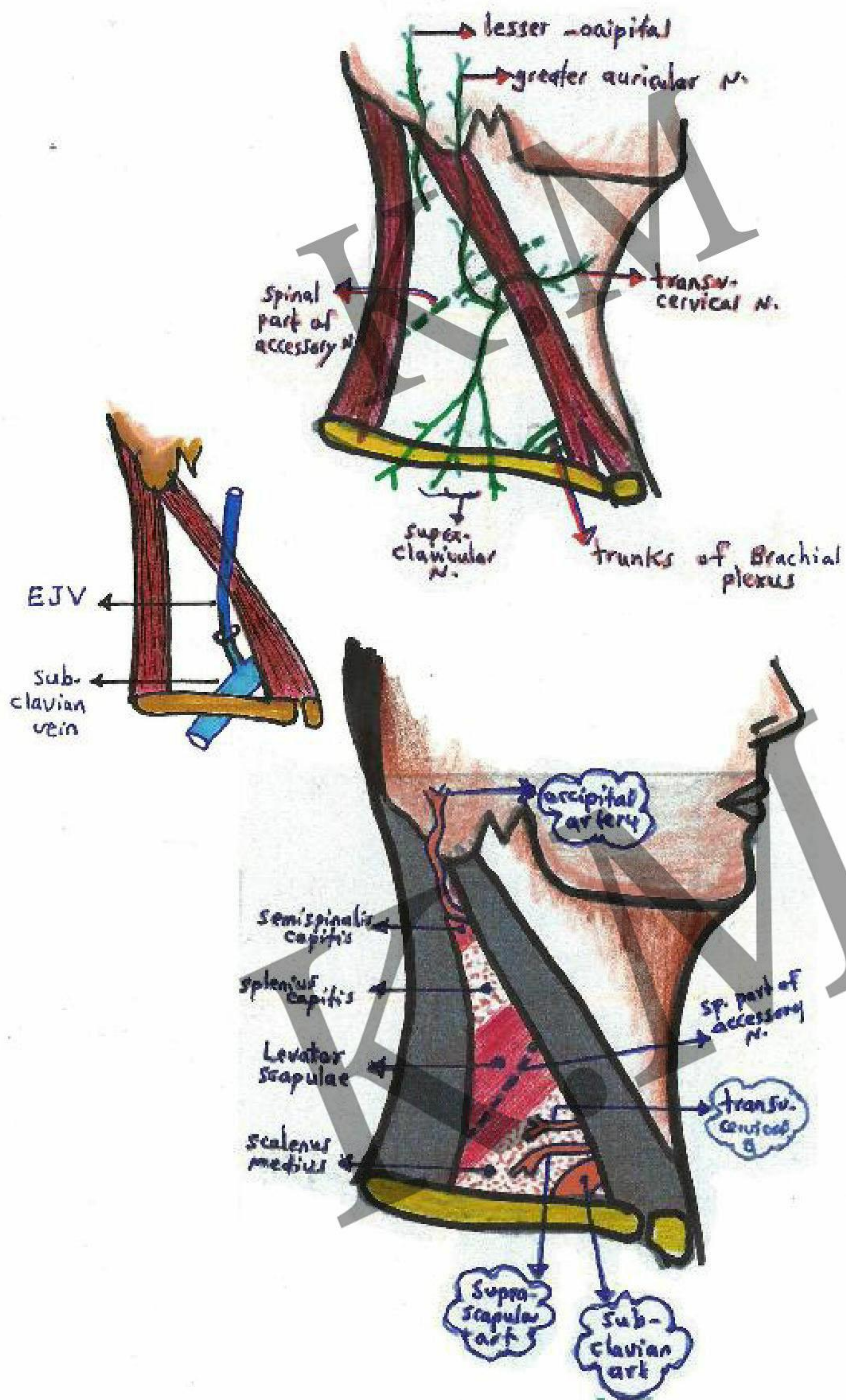
* CONTENTS :-

- Suboccipital nerve (dorsal ramus of C₁)
- Suboccipital venous plexus.
- Suboccipital LN.
- the 3rd part of vertebral artery.

NB: RCPM_J, RCPM_n, sup. & inf. oblique ms are supplied by C₁ Post. ramus.



CONTENTS OF POST. Δ



ANTERIOR Δ OF NECK

* BOUNDARIES :-

- Anteriorly :- Midline of neck.
- Posteriorly :- ant. border of sternomastoid.
- Superiorly :- base (lower margin) of body of mandible

* ROOF :-

- Skin, sup. fascia, platysma & investing layer of deep fascia.
- cervical br. of facial nerve & transv. cutaneous nerve (C2,3)

* SUBDIVISIONS :-

- the ant. Δ of neck is subdivided into submental, submandibular, muscular & carotid triangles $\rightarrow$ by digastric and sup. belly of omohyoid.

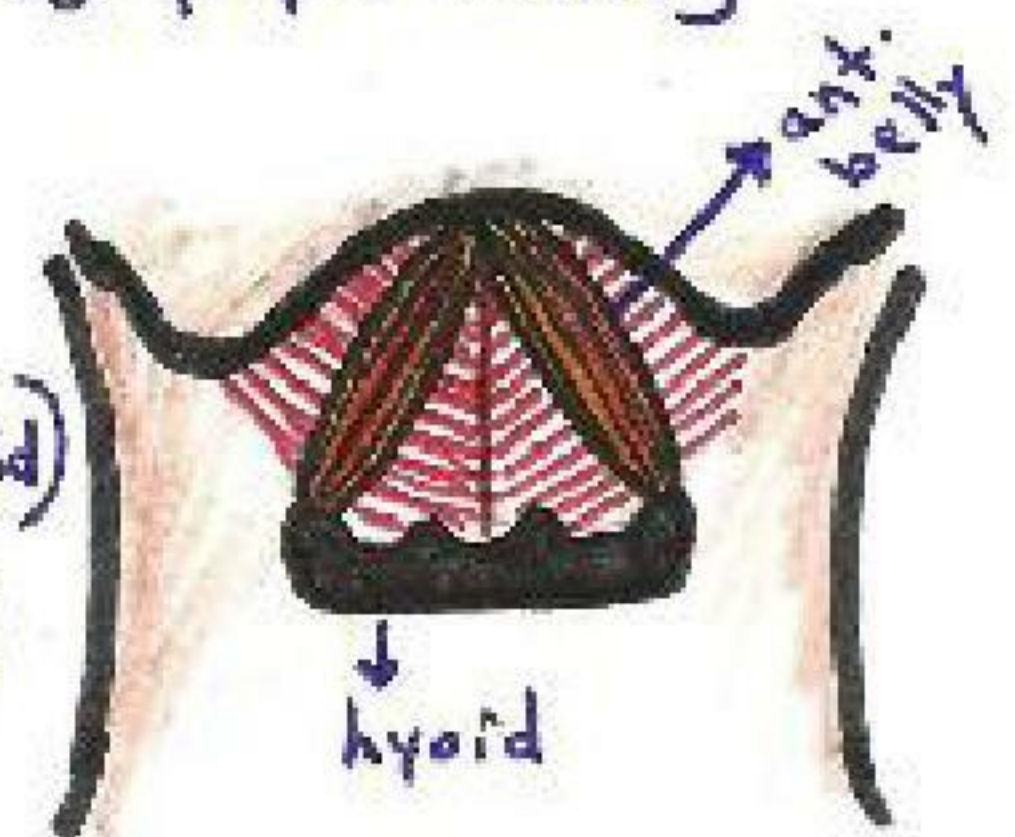


I - SUBMENTAL Δ :-

- * Boundaries :- • base (below) $\rightarrow$ body of hyoid bone [apex $\rightarrow$ symphysis ment.]
- on each side $\rightarrow$ ant. belly of digastric ms.

- * Floor :- $\rightarrow$ Mylohyoid ms & raphe.

- * Contents :- • submental LNs & vessels. $\rightarrow$ (N. to mylohyoid)
- beginning of ant. jugular vein (submental plexus)

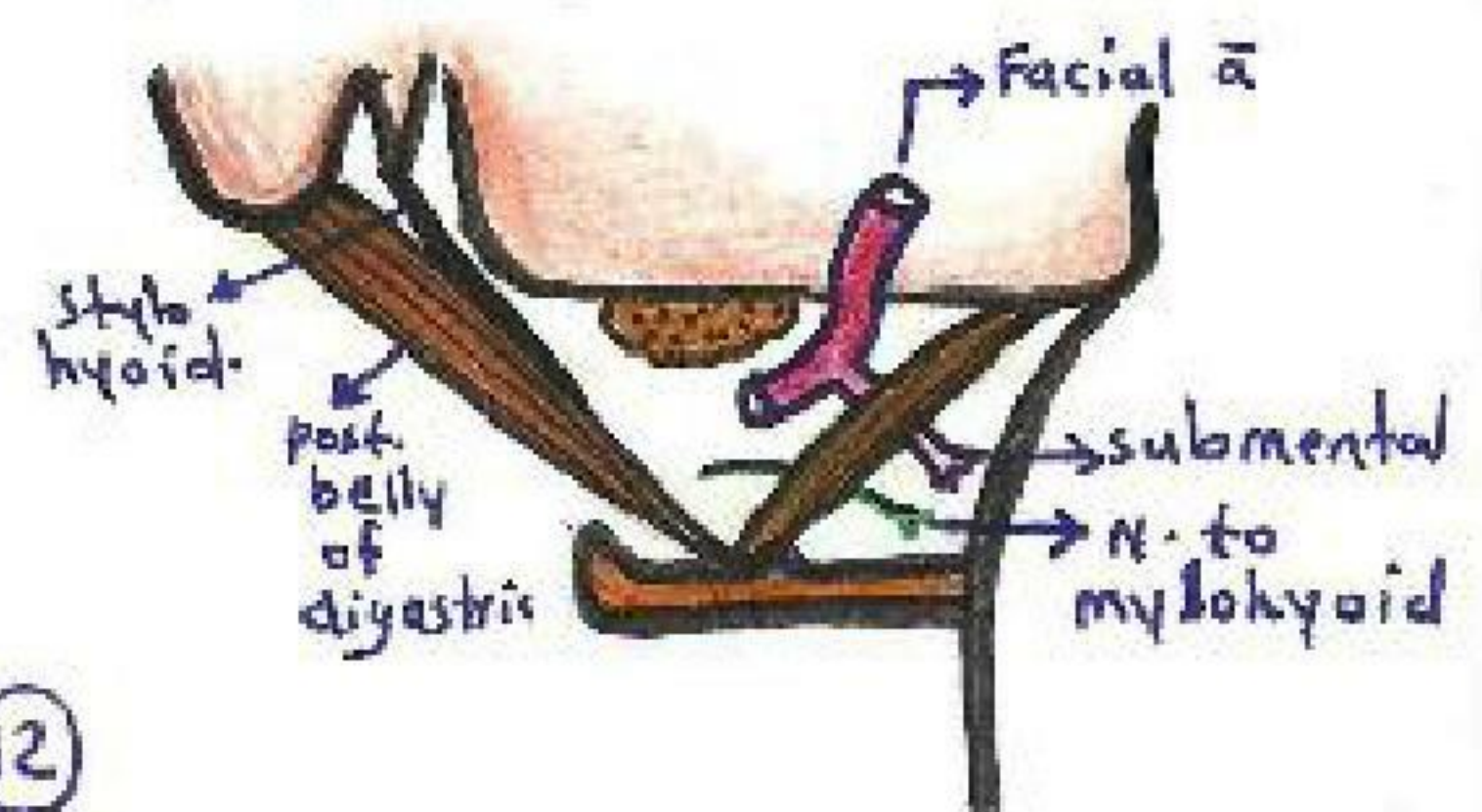


II - SUBMANDIBULAR Δ (Digastric Δ)

- * Boundaries :- • Anteriorly :- ant. belly of digastric
- Posteriorly :- post belly of digastric & stylohyoid ms.
- Superiorly :- base of mandible.

- * Floor :- mylohyoid & hyoglossus.

- * Contents :- • submandibular LNs, facial vessels
- submandibular gland.
- N. to mylohyoid, hypoglossal nerve (12)
- (posteriorly contains carotid sheath)



III - MUSCULAR Δ

* Boundaries :-

- Anteriorly :- midline of neck.

- above :- sup. belly of omohyoid.

- below :- ant. border of sternomastoid

* Floor of Δ :- infrahyoid ms (sternohyoid, sternothyroid & thyrohyoid)

[under the floor $\rightarrow$ thyroid gland, larynx, trachea & esophagus].

IV - CAROTID Δ

* Boundaries :-

- above :- Post. belly of digastric.

- below :- sup. belly of omohyoid.

- Posteriorly :- ant. border of sternomastoid.

* Floor of Δ :- thyrohyoid, hyoglossus.

- Middle & inferior constrictors of pharynx.

* Contents :-

- 1- the ^{carotid sheath} 3 carotid arteries (CCA, ICA, ECA with its branches)
- 2- IJV & 3 of its tributaries (common facial, lingual & sup. thyroid).
- 3- last 3 cranial nerves (10, 11 & 12)
- 4- 3 small nerves (descends hypoglossi, descends cervicalis & ^{int. & ext. laryngeal N.})
- 5- ^{deep} cervical LNs & cervical symp. chain

* NOTES :-

- Infrahyoid muscles (Pretracheal ms) are sternothyroid, sternohyoid, thyrohyoid & omohyoid $\rightarrow$ supplied by ansa cervicalis C1,2,3 except thyrohyoid by C1.

- Structures in midline of neck from above downward are :-

① Mylohyoid

② hyoid bone

③ thyrohyoid membrane

④ thyroid cartilage

⑤ cricothyroid lig.

⑥ cricoid cartilage

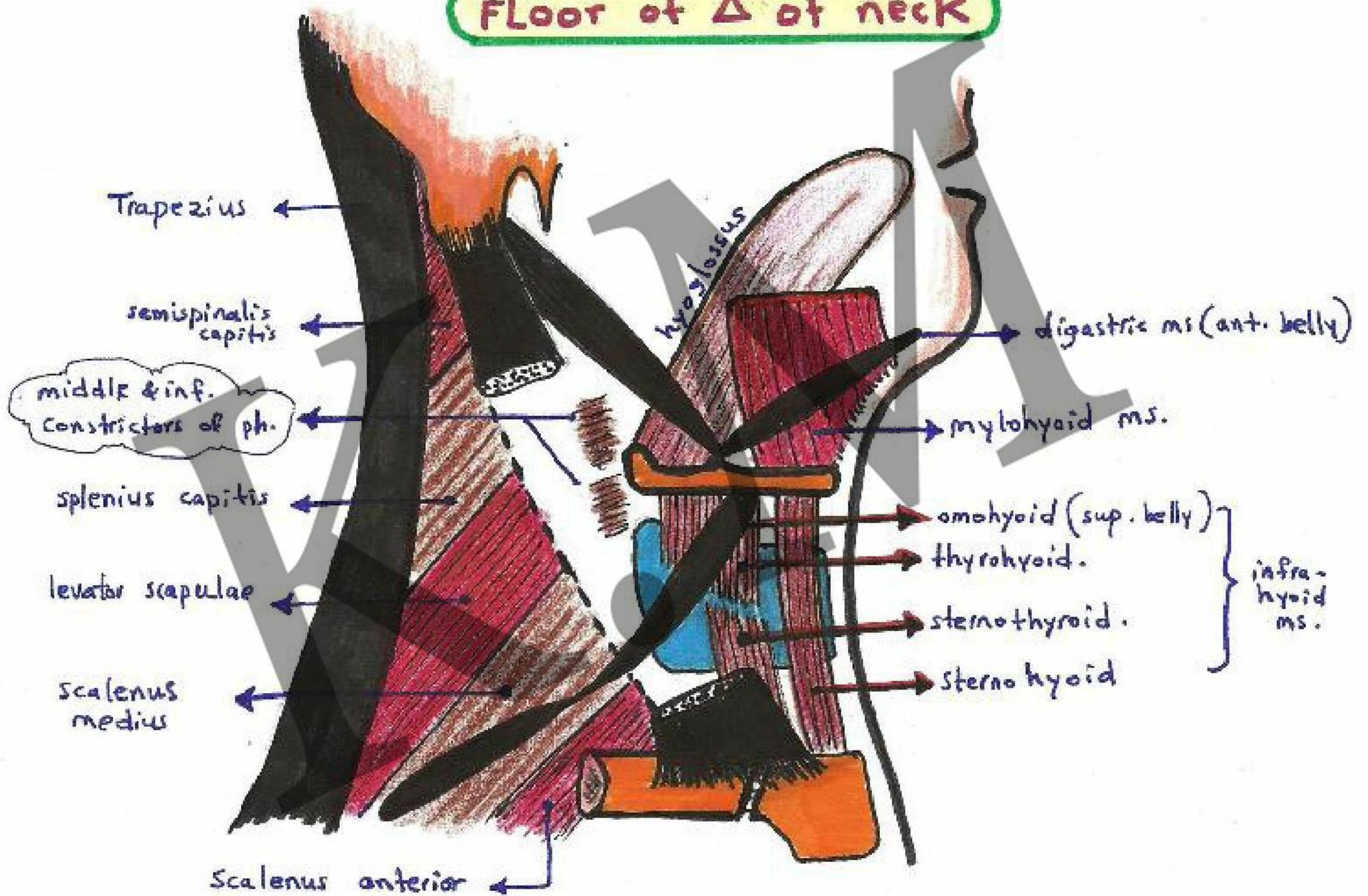
⑦ cricothyroid lig.

⑧ trachea (1st ring)

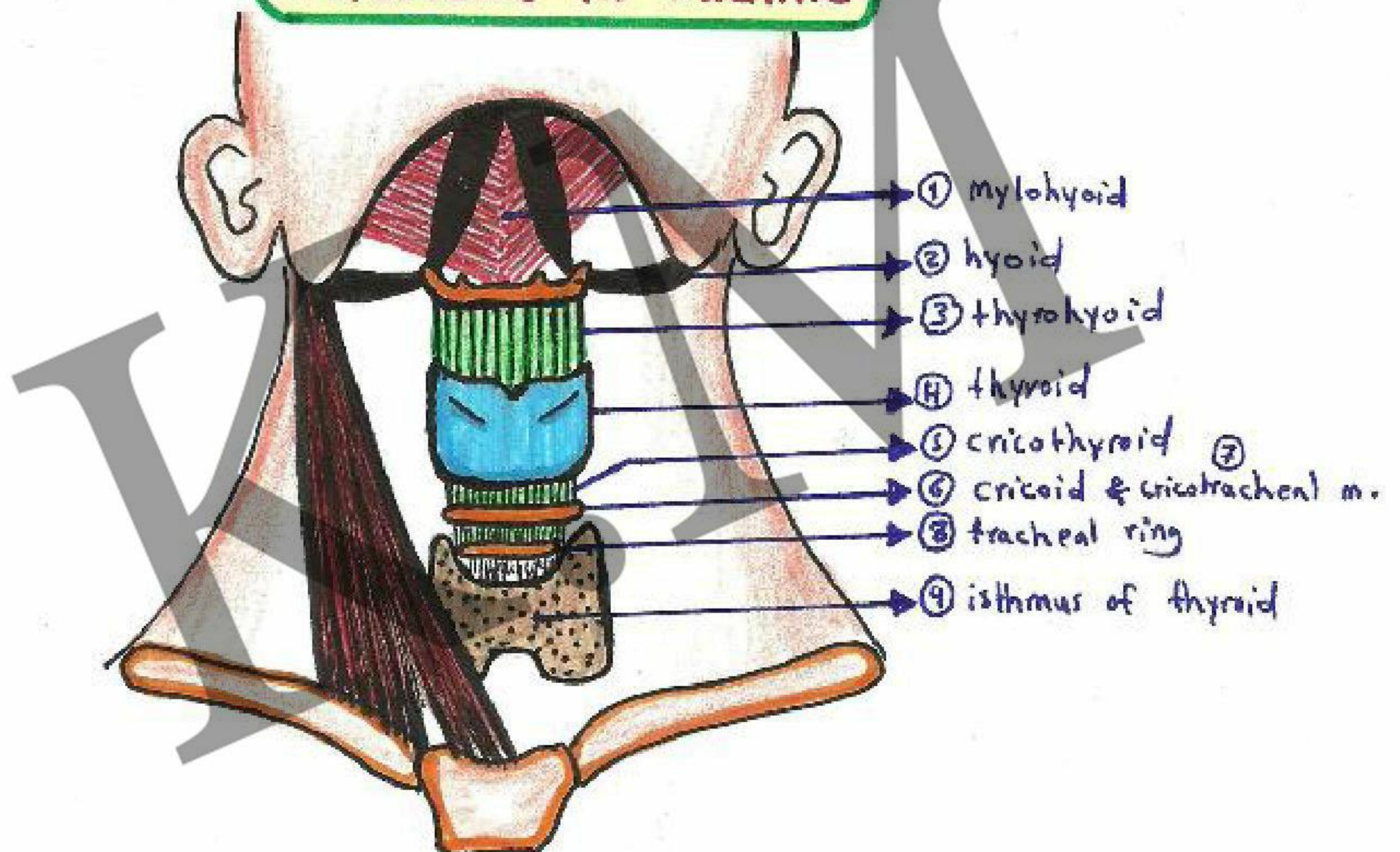
⑨ thyroid gland (isthmus)

⑩ suprasternal notch.

Floor of Δ of neck



Structures in midline



SUB-MANDIBULAR REGION

Lies under cover of body of mandible, between mandible & hyoid bone.

* CONTENTS :-

- 1- Muscles :- digastric, styloglossus, hyoglossus, mylohyoid, genioglossus & geniohyoid $\rightsquigarrow$ see ms. of neck.
- 2- Glands :- submandibular & sublingual salivary gland $\rightsquigarrow$ see later.
- 3- Nerves :- Lingual, glossopharyngeal & hypoglossal N. $\rightsquigarrow$ see nerves.
- 4- Ganglion :- submandibular parasympathetic ganglion. $\rightsquigarrow$ see later
- 5- Lymph nodes :- submandibular LN $\rightsquigarrow$ see LN. of H & N.

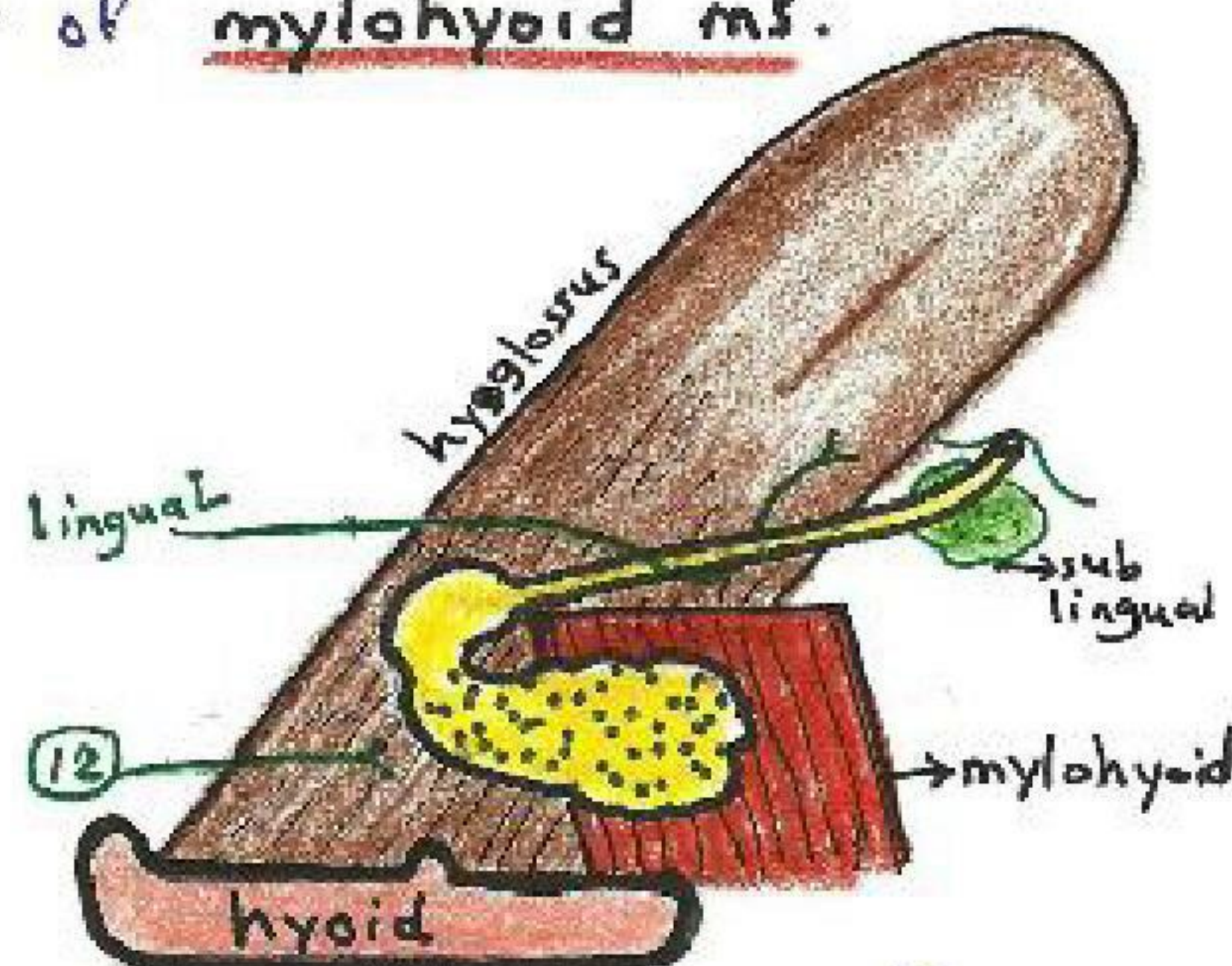
SUBMANDIBULAR GLAND :-

* Description :-

- Large salivary gland extends from mental foramen to angle of mandible., (bet. ant. belly & post. bellies of digastric)
- It has a large superficial part & small deep part continuous with each other around post. border of mylohyoid ms.

* Submandibular duct :-

- arise from deep part, 5 cm long.
- runs between mylohyoid (laterally) and hyoglossus (medially)
- related to lingual nerve ^(above) that hooks around the duct.
- opens under the tongue in the sublingual papilla at sublingual fold (at floor of mouth).



NB:- submand. gland - surrounded by c.t. capsule

- enclosed in dense fibrous capsule derived from investing layer of deep fascia

* Relations :-

A - Superficial Part :-

- Medially :- mylohyoid muscle, nerve & vessels.
 - hyoglossus muscle, hypoglossal nerve & lingual nerve
- Laterally :- submandibular fossa, submandibular LN.
 - skin, fascia, platysma, facial vein, facial N. (cervical br.)
 - [NB: facial artery is related to post. & sup. aspect of sup. part]

B - Deep part :-

- Medially :- hyoglossus & styloglossus
- Laterally: mylohyoid
- sup. :- lingual nerve & submand. ganglion
- inf. :- hypoglossal N. (12)

* Blood supply :- branches of facial & lingual arteries

* Nerve supply :-

- Symp. :- via plexus around facial & lingual arteries
- Parasymp. :- from submandibular ganglion.
- Sensory :- from lingual nerve.

* lymph drainage into submand LN & deep cervical LN

NB :- Preganglionic parasymp. fibers arise from sup. salivary nucleus (in pons) → Pass with facial N. → then through chorda tympani (br. of facial N.) → then joins the lingual N. → then relay in submand. ganglion

- Postganglionic secretory fibers pass from the ganglion to submandibular & sublingual glands.

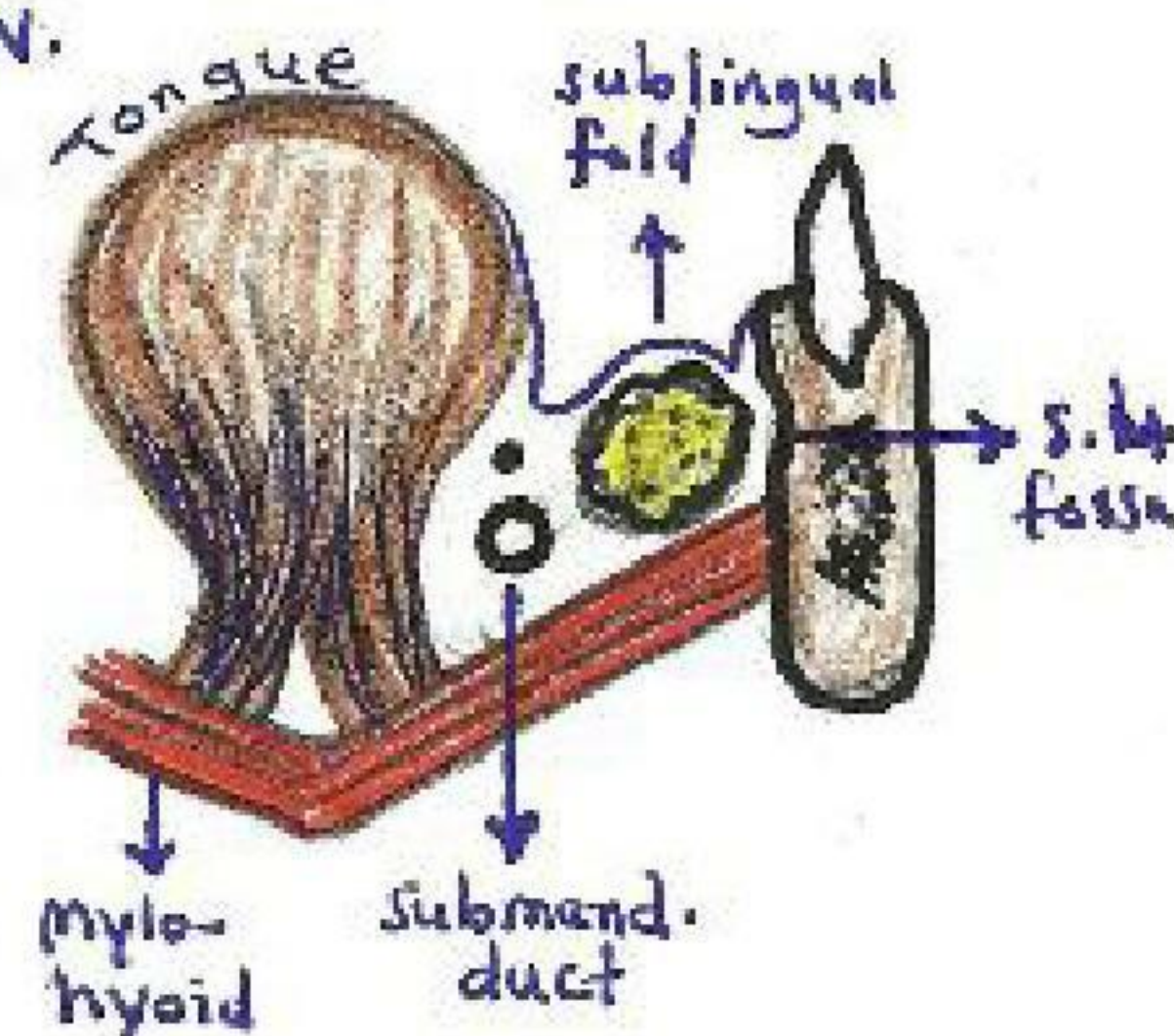
NB :- chorda tympani carries - ① taste fibers from ant. 2/3 tongue
② parasymp. fibers to SM & SL glands

SUB-LINGUAL GLAND :-

- The smallest of the 3 main salivary glands, lies beneath m.m. of floor of mouth (near midline).
- It has several small ducts (8-20) which open on sublingual fold (mucosa is elevated above the gland).

* Relations :-

- Medial : Genioglossus, submand. duct, lingual N.
- Lateral : sublingual fossa (at mandible).
- Superior : Sublingual fold (mucosa)
- Inferior : Mylohyoid muscle



* Blood supply :-

- branches of facial & lingual arteries.

* Nerve supply :-

- Symp. :- from symp. plexus around arteries.
- Parasymp. :- from submandibular ganglion.
- Sensory :- from Lingual nerve.

* Lymph drainage :-

- into submandibular LN & deep cervical LN.

SUB-MANDIBULAR GANGLION

- Small parasympathetic ganglion hanging from lingual N. (above mylohyoid).

* Relations :-

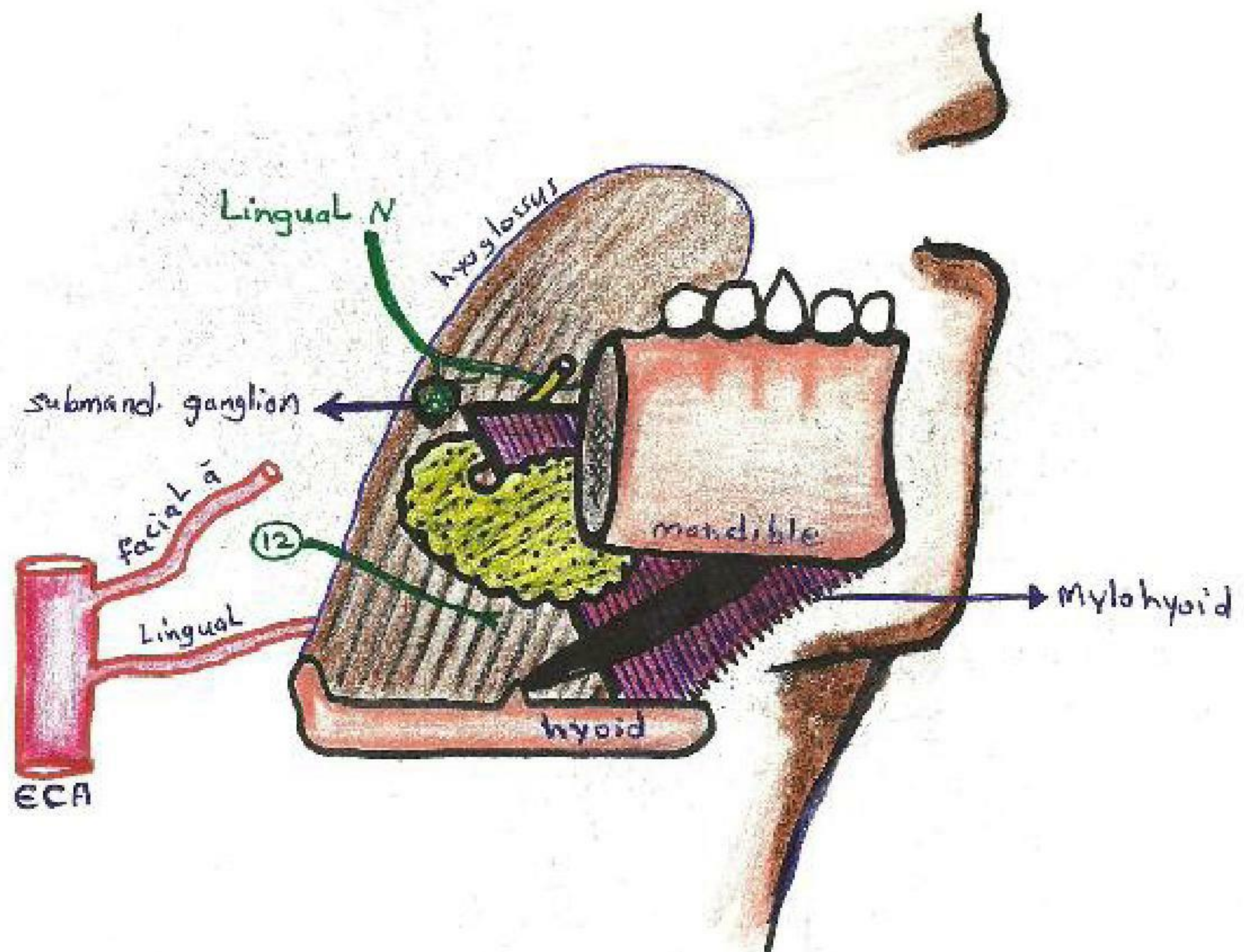
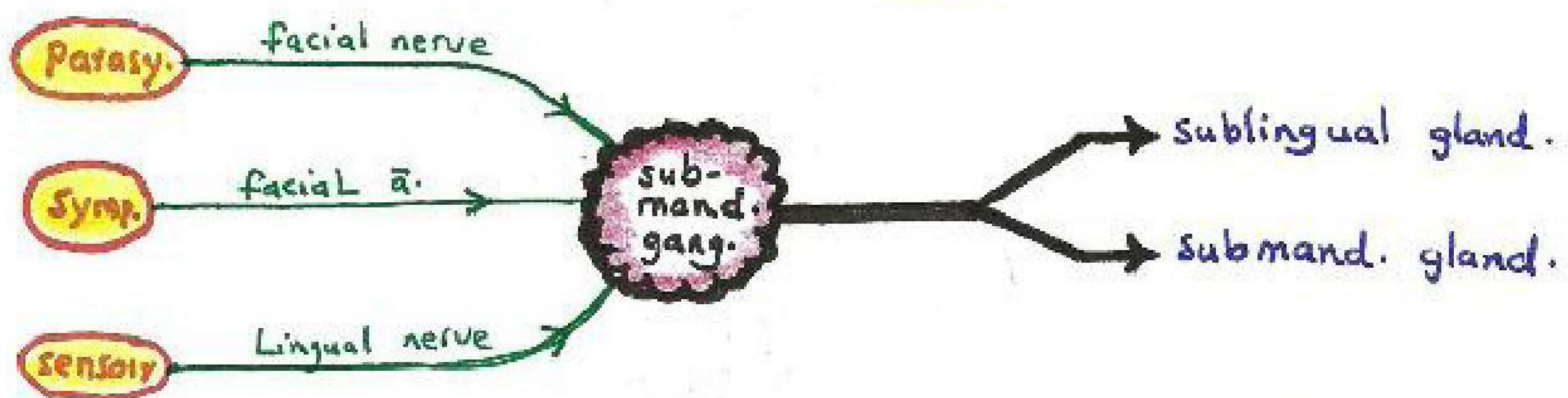
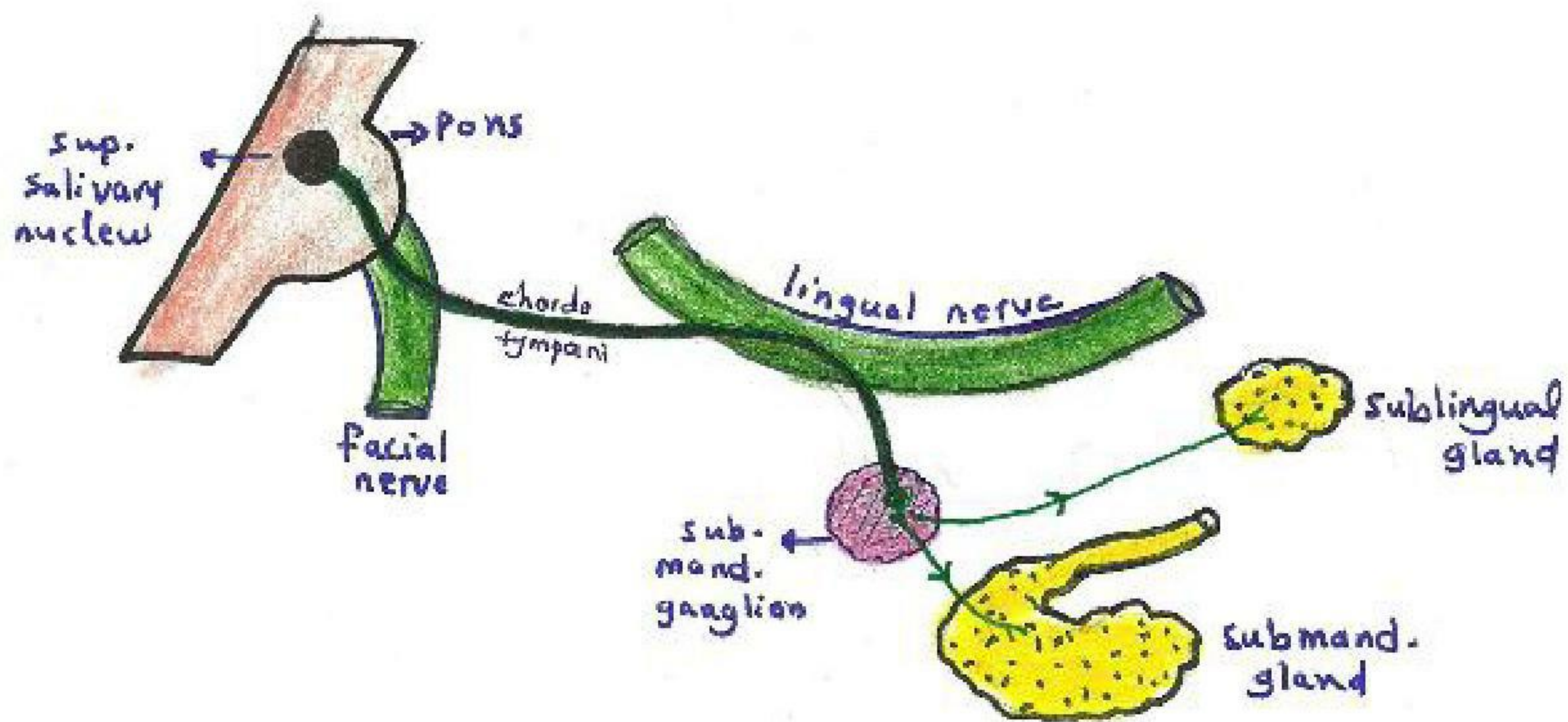
- medially : hyoglossus
- superiorly : lingual N.
- inferiorly : submand. duct.

* Roots :- (Preganglionic fibers) :-

- Preganglionic Parasymp. fibers :- from sup. salivary nucleus → reach via chorda tympani & lingual nerve. → (synapse & pass to submand. gland)
- Symp. → from plexus around facial artery (pass without synapse vasomotor to blood vessels)
- Sensory → from lingual nerve.

* Branches (Post ganglionic) :-

- post. ganglionic fibers to submandibular & sublingual glands.



SUBMANDIBULAR GLAND & GANGLION.

THYROID GLAND

* DESCRIPTION :-

- It is a very vascular organ present in the neck mainly in muscular Δ .
- Consists of 2 lobes connected by isthmus.
- The isthmus present in front of 2nd, 3rd & 4th tracheal rings.
- Each lobe is pyramidal (or Pear) in shape with apex reaching the oblique line of thyroid cartilage & base at level of 4th or 5th tracheal rings.
- Each lobe has 3 surfaces (post, medial & lateral).
- Pyramidal lobe is often present projecting upward from isthmus (usually to Lt of midline) and connected to hyoid bone by levator glandulae thyroidae (muscular ~~OR~~ fibrous band).

* CAPSULE :-

- True capsule :- (fibrous) enclosing the gland.
- False capsule :- (fascial) from pretracheal fascia.

NB - Vessels of the gland runs between the 2 capsules.

NB - Pretracheal fascia attaches the gland to larynx & trachea so the gland moves with deglutation (swallowing).

* Relations :-

- **Isthmus** :- **ant** :- skin, fascia, ant. Jugular vein, sternohyoid & sternothyroid
Post :- 2nd, 3rd & 4th tracheal rings. (+ skin & fascia)
- **Lobe** :- **anterolaterally** :- sternomastoid, sternohyoid, sternothyroid & omohyoid
 - **Medially** :- Trachea, esophagus, larynx, pharynx, recurrent & ext. laryngeal nerve
 - **Posterior** :- Carotid sheath & its contents (CCA, IJV, vagus) $\rightarrow$ posterolateral
 - Parathyroid glands, symp. chain (behind carotid sheath)

* Blood supply :-

• Arterial:- ① sup. thyroid artery :- branch of ECA (ext. carotid a.)

- accompanied by ext. laryngeal N. (superf. to it).
- supplies the upper 1/3 of the lobe

② Inf. thyroid a. :- br. of thyrocervical trunk (1st part subclavian)

- related at end to recurrent laryngeal nerve.
- supplies the lower 2/3 of the lobe.

③ Thyroidae ima a. :- br. of arch of aorta (not always present)

- It is a single artery while sup. & inf. thyroid are paired
- supplies the isthmus.

• Venous:- ① sup. thyroid V. :- drains into int. jugular vein (Paired Rt, Lt)

② Middle thyroid V. :- drains into I.J.V (Paired → Rt & Lt).

③ Inf. thyroid V. :- receives tributaries from isthmus & lower poles by 2 inf. thyroid vein that anastomose to form single vein drains into Lt brachiocephalic vein (but may drain by 2 veins into 2 brachiocephali)

* Lymph drainage :-

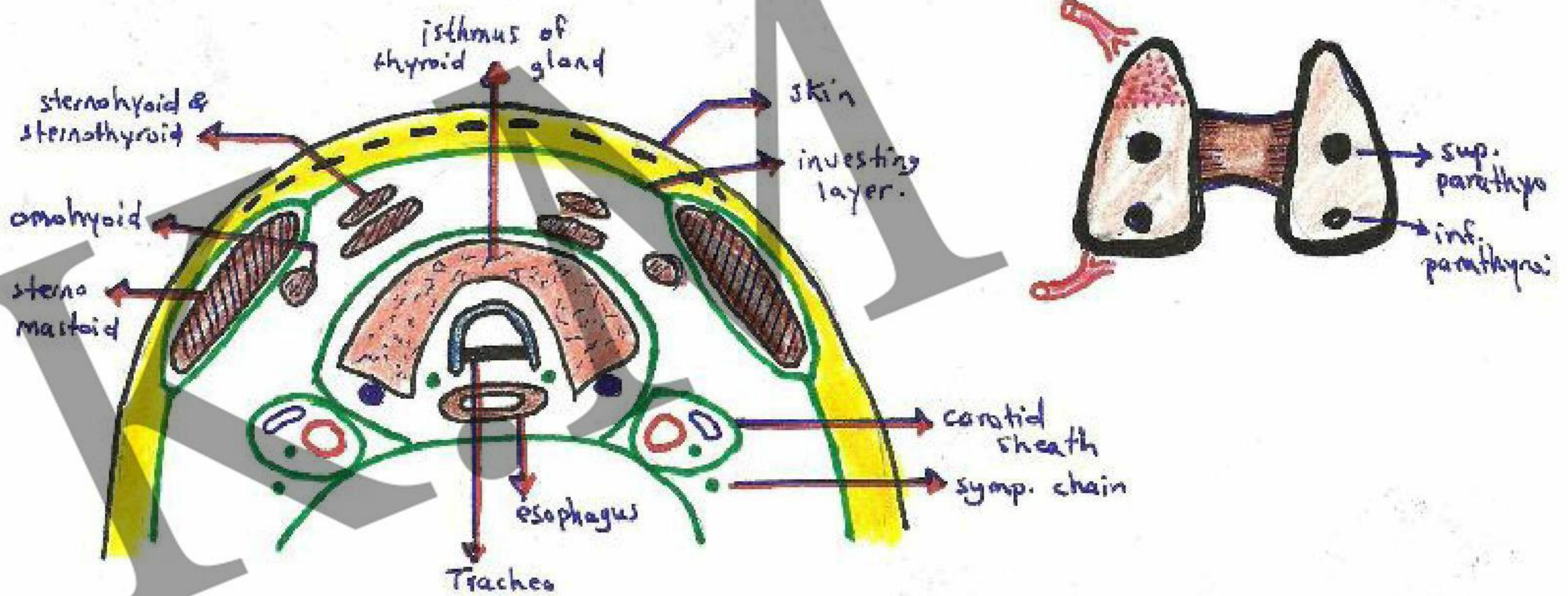
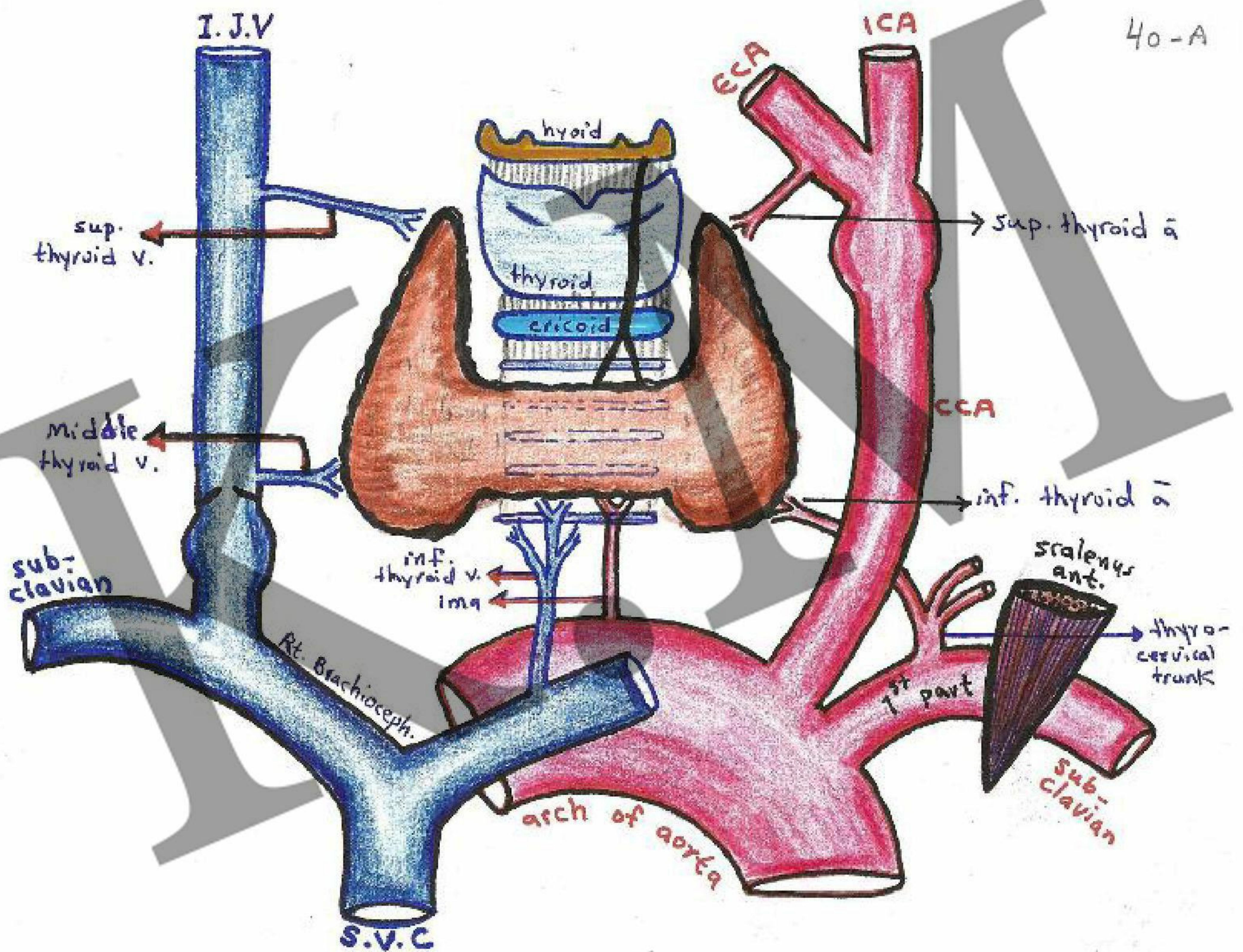
- mainly to deep cervical LN. , few vessels to Paratracheal nodes.

* Nerve supply :-

- Sympathetic plexus reaching the gland around its arteries.

PARATHYROID GLANDS :-

- yellowish-brown, ovoid bodies about 6 mm long in diameter.
- Usually 4 in number² related to Post. border of each lobe lying within the fascial capsule
- the 2 superior glands lies opposite the middle & the 2 inf. close to inferior poles of the gland.
- supplied by sup. & inf. thyroid arteries (mainly inf.)



THYROID & PARATHYROID

MUSCLES OF NECK

STERNOCLEIDOMASTOID :-

- * **ORIGIN** :- • Sternal head :- from manubrium sterni (rounded)
- Clavicular head :- from medial $\frac{1}{3}$ of upper surface of clavicle.
- * **Insertion** :- Mastoid process [& superior nuchal line of occipital bone].
- * **N/supply** :- spinal part of accessory N. [& C₂, C₃ ant. rami] $\rightarrow$ proprioceptive
- * **Action** :- both muscles :- flex the neck
- one muscle :- bends head to same side (ear ^{bring} to shoulder) and turns the face to opposite side

STERNO-HYOID :-

- * **ORIGIN** :- Post. surface of manubrium sterni
- * **Insertion** :- lower border of body of hyoid bone.
- * **N. supply** :- ansa cervicalis (C_{1,2,3}).
- * **Action** :- depression of hyoid.

STERNO-THYROID :-

- * **Origin** :- Post. surface of manubrium sterni [deep to sternohyoid]
- * **insertion** :- oblique line on lamina of thyroid cartilage.
- * **N. supply** :- ansa cervicalis (C_{1,2,3}).
- * **Action** :- depression of larynx.

THYRO-HYOID :-

- * **Origin** :- oblique line on lamina of thyroid cartilage.
- * **insertion** :- lower border of body of hyoid
- * **N. supply** :- C₁ (via branch of hypoglossal N.)
- * **Action** :- depression of hyoid or elevation of larynx.

OMO-HYOID :-

- * Origin :-
 - superior belly: lower border of body of hyoid.
 - inferior belly: upper margin of scapula & suprascapular lig.
- * Insertion :- both bellies inserted into intermediate tendon (which held in position by a loop of deep fascia to clavicle & 1st rib)
- * N. supply :- ansa cervicalis (C₁, 2, 3).
- * Action :- depression of hyoid bone.

DIGASTRIC Ms :-

- * Origin :-
 - Ant. belly :- digastric fossa of mandible (near ^{lower border} median plane)
 - Post. belly :- medial surface of mastoid process of temporal bone.
- * Insertion :- intermediate tendon (which held to hyoid near greater horn).
- * N. supply :-
 - Ant. belly → by nerve to mylohyoid.
 - Post. belly → by facial nerve (by nerve to stylohyoid).
- * Action :- depression of mandible or elevation of hyoid bone.

STYLO-HYOID :-

- * Origin :- styloid process of temporal bone.
- * Insertion :- hyoid bone (at junction bet. body & greater cornu). → pierced near its insertion by intermediate tendon of digastric.
- * N. supply :- facial N. (N. to stylohyoid)
- * Action :- elevation of hyoid bone.

MYLO-HYOID :-

- * Origin :- from mylohyoid line of mandible.
- * Insertion :-
 - Post. fibers ($\frac{1}{4}$) → to body of hyoid.
 - Ant. fibers ($\frac{3}{4}$) → mylohyoid raphe (from symphysis menti. to hyoid).
- * N. supply :- N. to mylohyoid (br. of inferior alveolar nerve).
- * Action :- elevation of hyoid & floor of mouth (during swallowing) or depression of mandible (when hyoid is fixed).

N.B :- mylohyoid muscle named as floor of mouth & called "diaphragmatica oris"

GENIOHYOID :-

- * Origin :- from inferior mental spine (inf. genial tubercle), behind symphysis menti.
- * Insertion :- hyoid bone (ant. surface of the body).
- * N. supply :- C₁ (through hypoglossal nerve).
- * action :- elevation of hyoid bone or depression of mandible.

GENIO-GLOSSUS :- (fan shaped)

- * Origin :- superior mental spine (sup. genial tubercle).
- * insertion :- to tongue (tip & dorsum) & by inf. fibers into hyoid bone
- * N. supply :- hypoglossal N. (CN-XII)
- * Action :- protraction (protrusion) of tongue.

HYO-GLOSSUS :- (Quadrilateral)

- * origin :- hyoid bone (upper border of body & greater cornu).
- * Insertion :- side of tongue.
- * N. supply :- hypoglossal nerve.
- * action :- depression of tongue.

STYLO-GLOSSUS :-

- * origin :- styloid process of temporal bone.
- * Insertion :- side of tongue.
- * N. supply :- hypoglossal nerve.
- * action :- retraction & elevation of tongue

NB :- Suprahyoid ms are :- stylohyoid, mylohyoid, geniohyoid, ^{& digastric} hyoglossus,
- Infrahyoid (strab) ms are :- sternohyoid, sternothyroid, thyrohyoid & omohyoid
- Ms. of root of neck are :- scalenus ant. medius & posterior.

SCALENUS ANTERIOR :-

- * Origin :- ant. tubercle of transverse process of C_{3,4,5,6} vertebrae.
- * Insertion :- scalene tubercle (on inner border of 1st rib).
- * N. supply :- C_{4,5,6} nerves (ant. rami).
- * Action :- - flexion of neck forward & laterally.
- assist in elevation of 1st rib.

SCALENUS MEDIUS :-

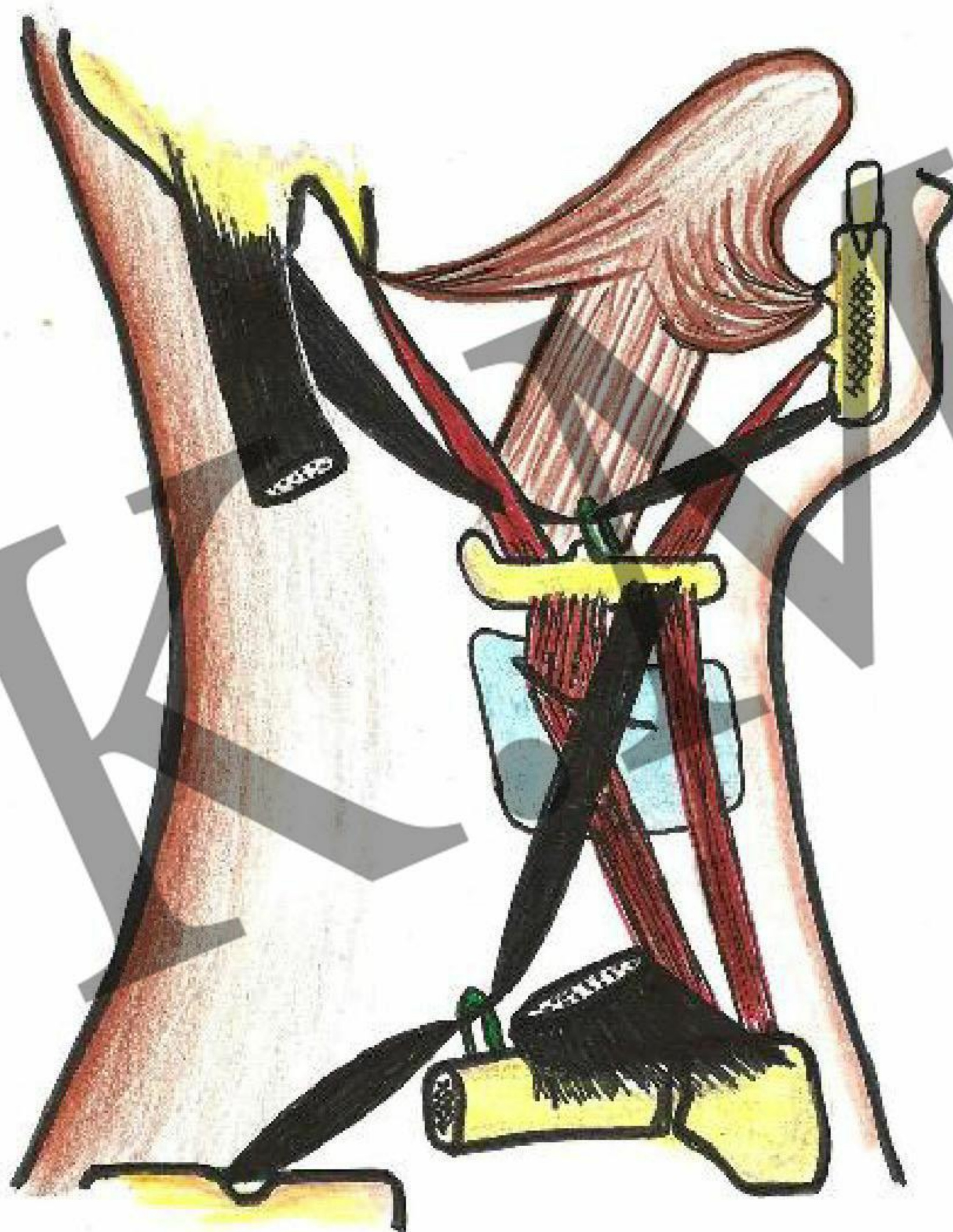
- * Origin :- Post. tubercles of trans. process of C_{1,2,3,4,5,6} vertebrae. ↗ (transv. ^{not tubercle} process of atlas)
- * Insertion :- upper surface of 1st rib (behind groove for subclavian artery).
- * N. supply :- branches of ant. rami of cervical nerves.
- * Action :- flex neck forward & laterally, assist in elevation of 1st rib.

SCALENUS POSTERIOR :- (may be absent or blend with sc. medius)

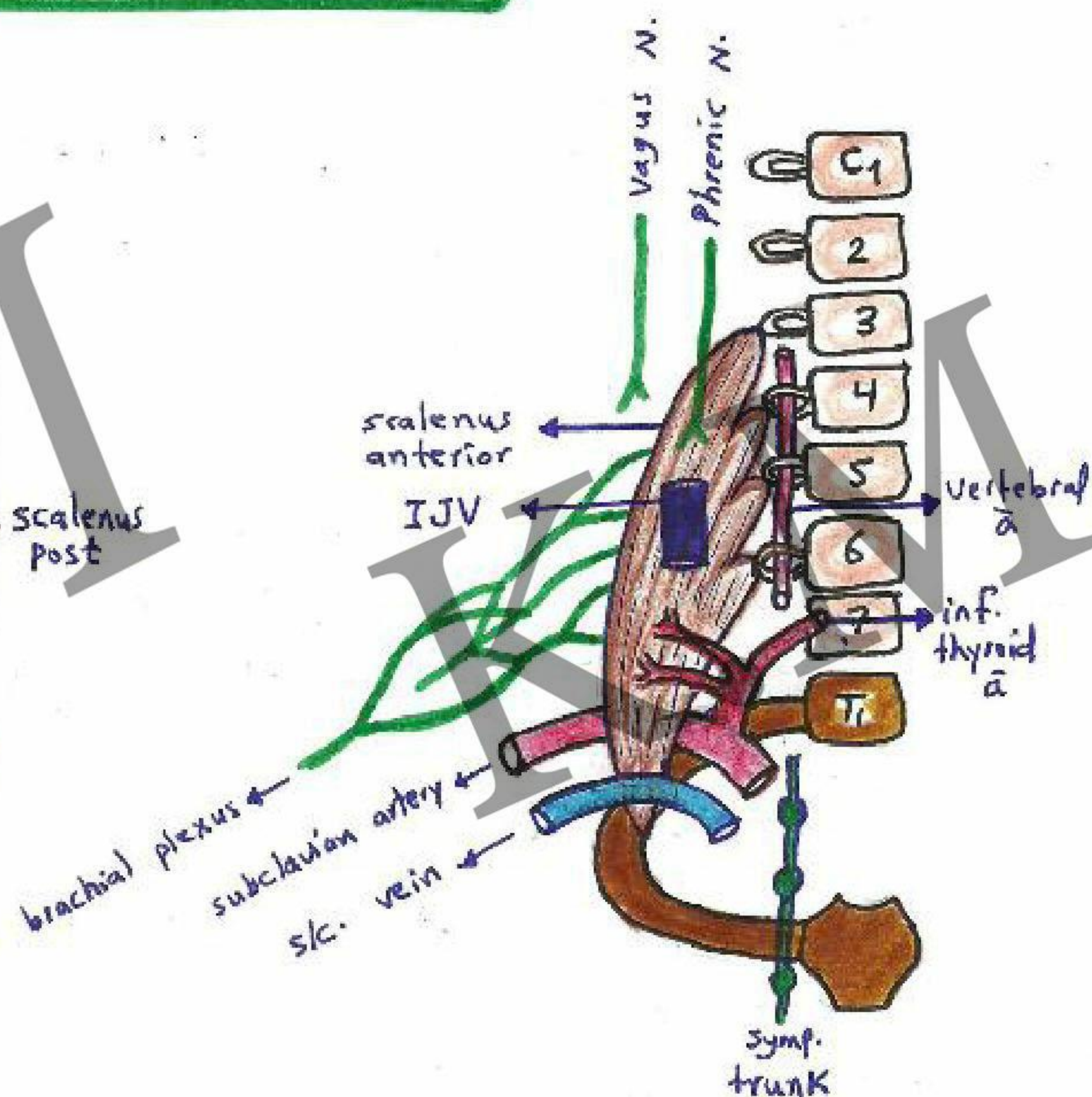
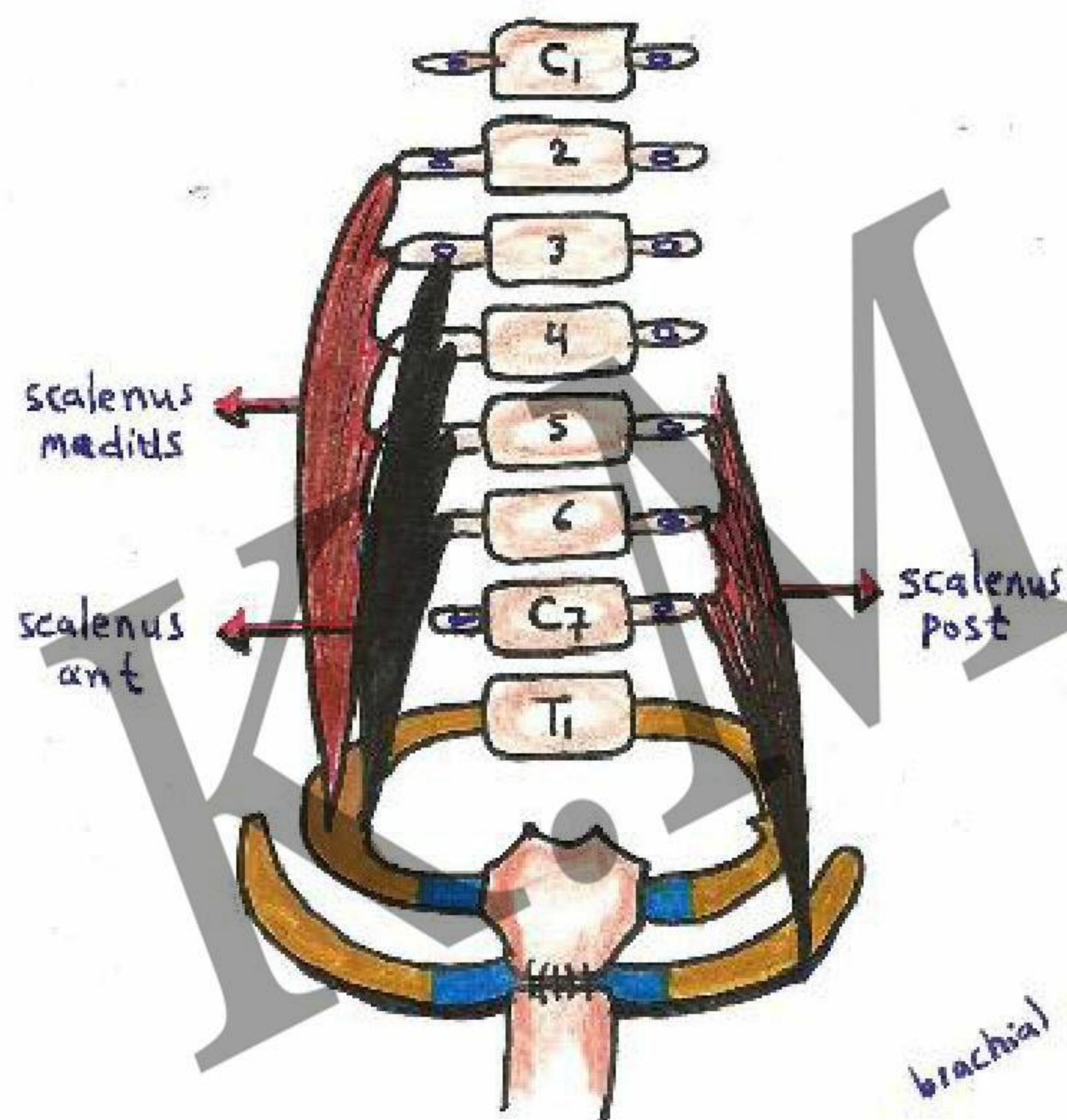
- * Origin :- Post. tubercles of trans. processes of lower cervical vertebrae.
- * Insertion :- outer surface of 2nd rib.
- * N. supply :- branches of ant. rami of lower cervical nerves.
- * Action :- flex neck forward & laterally, assist in elevation of 2nd rib.

*RELATIONS OF SCALENUS ANT. :-

- Anterior :- - Prevertebral fascia, Phrenic nerve.
- superficial cervical artery & suprascapular artery.
- Subclavian vein & IJV.
- posterior :- - subclavian artery (2nd part), cervical pleura.
- roots of brachial plexus.
- Medially :- - vertebral vessels, inf. thyroid artery & thyrocervical trunk
- sympathetic trunk, thoracic duct (Lt side). subclavian ^{1st} & _{2nd} part
- Laterally :- - subclavian artery (3rd part)
- trunks of brachial plexus, phrenic N. (root) -



MUSCLES OF NECK



VEINS OF NECK

I - E.J.V. : (Ext. Jugular Vein)

- discussed before.

II - I.J.V. : (int. Jugular Vein)

* Beginning :- continuation of sigmoid sinus at jugular foramen

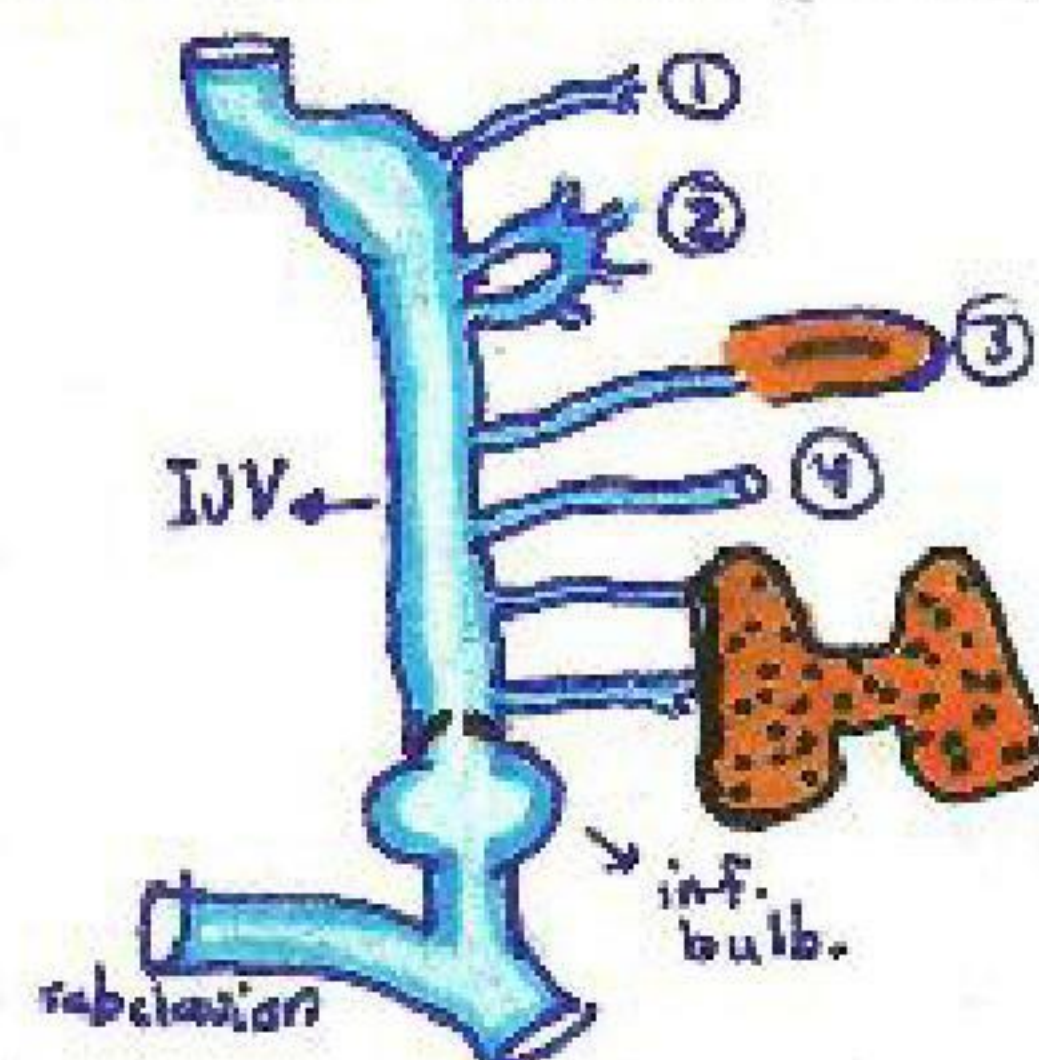
* End of I.J.V :- unites with subclavian vein to form the brachiocephalic (innominate) vein [behind medial end of clavicle].

* Course :- descends through the neck in carotid sheath lateral to ICA & CCA.

- Has dilatations at upper end (sup. bulb) and at lower end (inf. bulb).

- Bicuspid valve lies above the inferior bulb. (2 valves)

- * Tributaries:
- ① inferior petrosal sinus.
 - ② pharyngeal veins (draining ph. plexus)
 - ③ Lingual vein
 - ④ Facial (common facial) vein
 - ⑤ superior thyroid vein
 - ⑥ Middle thyroid vein



NB occipital vein drain into IJV, or vertebral or post. auricular vein.

Relation

• Antero-lateral : (superf.) :-

- Skin, fascia, platysma, sternomastoid
- trans. cut. x., parotid gland
- infrahyoid ms & ansa cervicalis → in lower part
- digastric (post. belly)
- post. auricular a.
- occipital artery
- spinal part of accessory n
- styloid process & its attachment
- deep cervical LN → in upper part

usually Rt IJV larger than Lt one.

• Anteromedial (medial)

- ICA, last 4 cranial nerves → in upper part
- CCA, & vagus → in lower part

• Posterior :-

- "From above downward"
- transv. processes of cervical vertebrae
- levator scapulae
- scalenus medius & cervical plexus
- scalenus ant. & phrenic nerve
- thyrocervical trunk
- vertebral vein
- subclavian artery (1st part)
- thoracic duct on Lt side

III - SUBCLAVIAN VEIN :-

- * **Beginning** :- at outer border of 1st rib as continuation of axillary vein.
- * **End** :- Joining IJV to form brachiocephalic vein (behind med. end of clavicle)
- * **Tributaries** :- only EJV (ext. jugular vein).
- * **Relations** :-
 - Anteriorly :- clavicle & subclavius ms.
 - Posteriorly :- scalenus ant & ~~phrenic~~ ^{subclavian} n. (separating it from 1st a.)
 - Inferiorly :- 1st rib & cervical pleura.

IV - VERTEBRAL VEIN :-

- * **Beginning** :- begins in the suboccipital triangle.
- * **End** :- into the corresponding brachiocephalic vein.
- * **Communications** :-
 - ① with sigmoid sinus (via post. condylar emissary vein)
 - ② with occipital vein
 - ③ internal vertebral venous plexus.
- * **Course** :- descends in the foramina transversaria of the upper 6 cervical vertebrae (around 2nd part vertebral artery)

LYMPH DRAINAGE OF H&N

- The lymphatic tissue of the H&N. forms $\frac{1}{3}$ of lymphatic tissue of the whole body.
- The lymphatic tissue of H&N is divided into $\left\{ \begin{array}{l} \text{adenoid tissue.} \\ \text{lymph nodes.} \end{array} \right.$

I- ADENOID TISSUE :-

- It is the aggregation of lymphoid tissue which guards the entrance of the alimentary & respiratory tracts.
- It forms a ring called lymphatic ring of **Waldeyer** which includes:-
 - ① Superiorly :- nasopharyngeal tonsil at roof of nasopharynx.
 - ② Inferiorly :- Lingual tonsil on dorsum of Post. $\frac{1}{3}$ of tongue.
 - ③ Laterally :- Palatine tonsils between Palatoglossal & Palatopharyngeal folds.
- * **Drainage** :- efferent from Waldeyer's ring drain into deep cervical LN.

II - LN. OF THE H&N :-

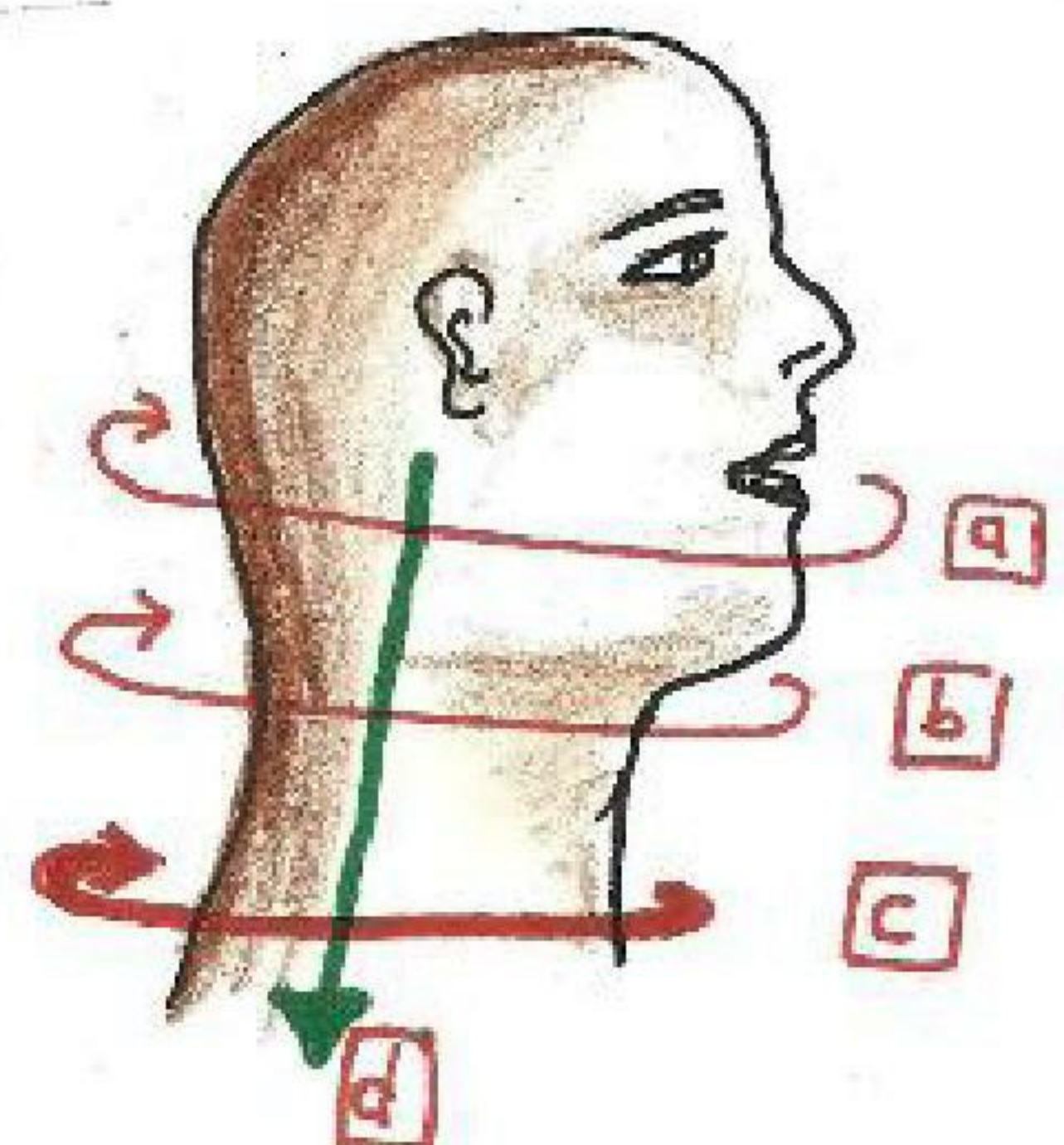
- * the lymph nodes of H&N arranged in
 - a) superficial circular group of head.
 - b) superficial " " " neck.
 - c) deep circular group of H&N.
 - d) Vertical chain in between the circular groups.

Also LN of H&N can be divided into:-

A Regional gp. of LN :-

- | | | |
|--------------------|-----------------------------|-----------------|
| 1- occipital LN. | 7- ant. cervical LN. | |
| 2- mastoid " | 8- superficial cervical LN. | |
| 3- Parotid " | 9- Retropharyngeal LN. | } deep circular |
| 4- Buccal (facial) | 10- laryngeal LN. | |
| 5- submandibular | 11- Tracheal LN. | |
| 6- Submental | | |

B Terminal (deep cervical) LN. $\rightarrow$ vertical chain



A- Superficial circular LN of head:-

L.N.	Site	area drained (afferent)	efferent
-Occipital LN	at apex of post. Δ along occipital $\bar{a}$.	- back of scalp & neck	upper deep cervical LN. (upper DC LN)
-Post auricular LN (mastoid)	behind auricle (along post. auricular vessels)	- scalp above auricle - external auditory meatus.	upper deep cervical LN. DC LN
-Parotid LN	-on or within the parotid gland.	- temporal region, auricle, ext. auditory meatus, eyelids, gums, upper $\frac{1}{2}$ of face	upper deep cervical LN & sup. cervical LN
-Buccal LN	-on Buccinator, close to facial vessels	- cheeks & lips	submandibular LN.

B- Superficial circular LN of neck :-

L.N	site	afferent	efferent
Submental LN	- submental Δ on mylohyoid ms.	- tip of tongue, floor of mouth - Central part of lip, chin.	- Submandibular & lower DC LN
Submandibular LN	- between submandibular gland & lower border of mandible	- most of face (cheek, lip, nose) - floor of mouth - side of tongue	- Submand. LN & lower deep cervical LN
Anterior cervical LN	- along anterior jugular vein	- ant. region of neck below hyoid.	- upper Deep cervical LN - Pretracheal LN
- Superficial cervical LN	- along External jugular vein	- lobule of ear, apex of parotid & angle of mandible	- upper Deep cervical LN

C- Deep circular LN of H & N :-

LN	site	afferent	efferent
- Retro-pharyngeal LN	- retropharyngeal space	- nasopharynx, paranasal sinus & Eustachian tube	upper deep cervical LN
- Paratracheal & Pretracheal LN	- Lateral & in front of trachea (respectively)	- pharynx, larynx, trachea, esophagus & thyroid gland	upper & lower deep cervical LN
- laryngeal LN	- in front of larynx (on cricothyroid lig.)	- larynx & adjacent tissue	upper & lower deep cervical LN.

Tracheal

D- Vertical group of deep cervical LN :-

- These are the main LN of Neck, along I.J.V.
- they are divided into 2 groups :-

① upper deep cervical LN :-

- the most imp. member of this group called Jugulo-digastric LN.
lying between I.J.V & post. belly of digastric ms.

- Afferent :- from tonsil & tongue ("the most commonly enlarged LN in body")

- Efferent :- to lower deep cervical LN.

②- Lower deep cervical LN :-

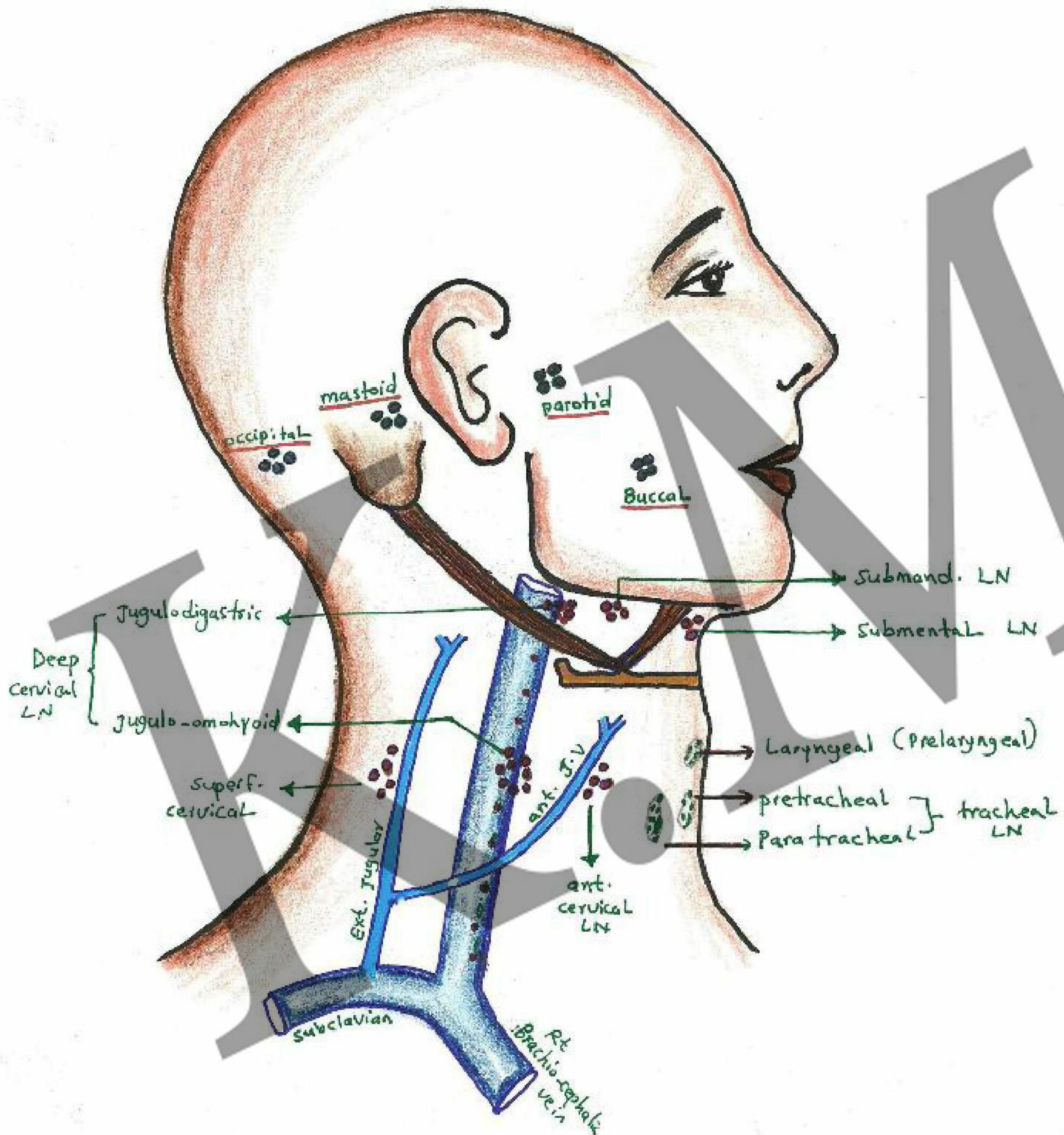
- the most imp. member of this gp called Jugulo-omohyoid LN.
lying bet. I.J.V & intermediate tendon of omohyoid.

- Afferent :- from tongue

- Efferent :- to jugular lymph trunk

N.B :- Efferents from lower deep cervical LN drains into jugular lymph trunk that drain into thoracic duct (in Lt side) and Rt lymphatic duct (on Rt side).

LYMPH DRAIN OF H&N



ARTERIES OF HEAD AND NECK

SUBCLAVIAN A. :-

* BEGINNING :-

- Rt subclavian artery: is a br. of brachiocephalic artery behind Rt sternoclavicular joint.
- Lt subclavian artery: br. of arch of aorta behind Lt CCA

* END :-

- Continuous as axillary artery at outer border of 1st rib

* COURSE :-

- each subclavia a. enters the neck, curves upward.
- It is divided by scalenus anterior ms into 3 parts where the 2nd part behind the muscle

* BRANCHES :-

- First Part: gives:-

- ① Vertebral artery.
- ② Internal thoracic (mammary) a.
- ③ Thyrocervical trunk which gives
 - inf. thyroid a.
 - superficial cervical a.
 - suprascapular a.

- Second Part:-

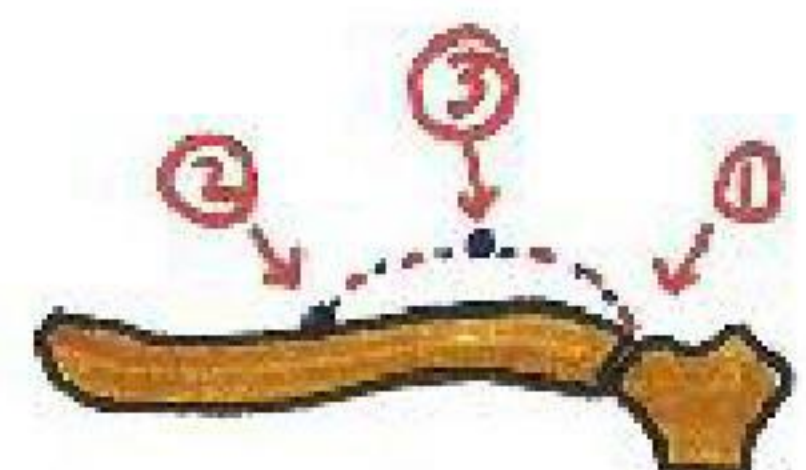
- costo cervical trunk which gives
 - superior intercostal a.
 - deep cervical a.

- Third Part:-

- No branches (occasionally ~~gives~~ sup. cervical or suprascapular or both arise from it) occasionally it gives dorsal scapular.

* SURFACE ANATOMY :-

- Draw a line from sternoclavicular joint^① to midclavicular Point^②, the line is convex upward 1 inch (fingerbreath) → represent subclavian artery.



* RELATIONS :-

• First Part :-

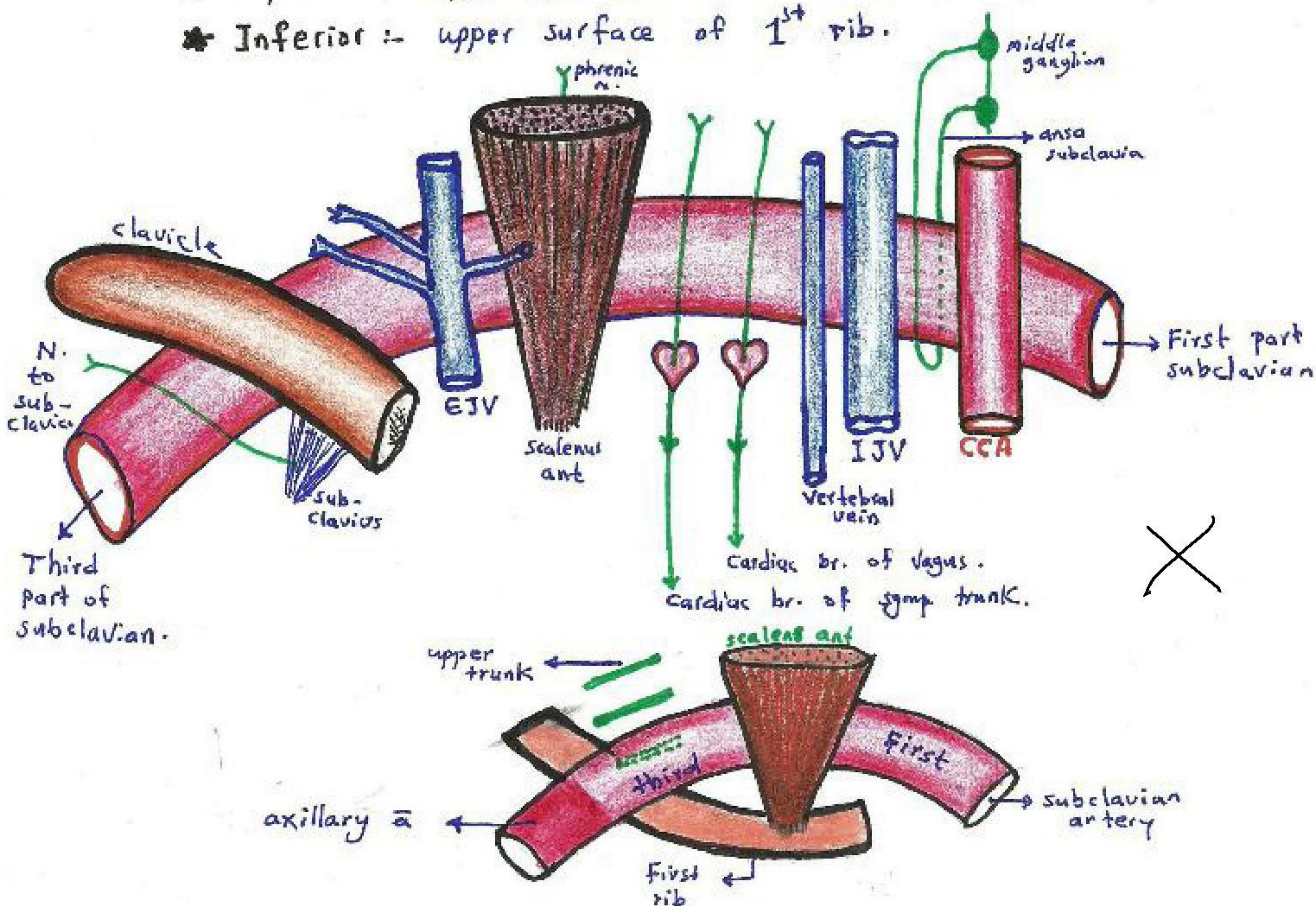
- Anterior :- ^{- sternomastoid, infrahyoid m.} (from medial to lateral) → CCA, ansa subclavia, vagus N., IJV, vertebral vein, cardiac br. of vagus N., cardiac br. of symp. trunk.
 [on Lt side: phrenic N.] [NB: phrenic N. in Rt side is ant. to 2nd part]
- Posterior :- cervical pleura, apex of lung & ansa subclavia.
 [on Rt side: Rt recurrent laryngeal nerve].

• Second Part :-

- Anterior :- scalenus anterior m (on Rt side: phrenic N.)
- Posterior :- cervical pleura, apex of lung

• Third Part :-

- Anterior :- skin, fascia, platysma, clavicle, N. to subclavius, EJV & its tributaries (trans. cervical, suprascapular & ant. J.V.).
- Posterior :- scalenus medius, lower trunk of brachial plexus.
- Superior :- upper & middle trunks of brachial plexus.
- Inferior :- upper surface of 1st rib.



* VERTEBRAL ARTERY :

* Origin :- From 1st part subclavian artery.

* End :- at lower border of pons by joining it's fellow of the opposite side to form basilar artery.

* Course & relation :- divided into 4 parts :-

- First part :- from origin to transverse process of C₆.
- ascends in vertebral Δ between longus colli ms (medially) and scalenus ant. (laterally).
- Second part :- Inside foramina transversaria of C₆ $\rightarrow$ C₁ (upper 6 cervical vertebrae), in front of ant. 1st rami of C₆ $\rightarrow$ C₂
- Third part :- Inside suboccipital Δ , curves behind the lateral mass of atlas (grooving upper surface of post. arch of C₁)
- Fourth part :- Inside the cranial cavity throug Foramen magnum on side of medulla.

* Branches :- [A] Branches in the neck :-

- 1- spinal branches to supply spinal cord (throug intervertebral foramen)
- 2- Muscular br. to deep muscles of neck.

[B] Branches in the cranial cavity :-

- 1- spinal arteries (ant. & post. spinal arteries).
- 2- Medullary branches (to medulla)
- 3- Post. inferior cerebellar Artery.

* THYRO-CERVICAL TRUNK :

* origin :- Front of 1st part of subclavian a (at medial border of ^{ant.} scalenus)

* Branches :- ① Inferior thyroid a :-

- Ascend along medial border of scalenus medius to level of cricoid cartilage, turns medially & downward
Passing : behind $\rightarrow$ vagus & CCA, In front of : $\rightarrow$ vertebral artery, & vertebral vein & symp. trunk.

- Branches of inf. thyroid artery are:
 1. inf. laryngeal a (accompanies recurrent laryngeal N.
 2. Ascending cervical a.
 3. Branches to trachea & esophagus in the neck.

② Suprascapular a :-

- Passes laterally ~~between~~ across scalenus ant & phrenic N.
- Passes down-ward behind clavicle with suprascapular N. and shares in the anastomosis around scapula.

③ Superficial (transv.) cervical a :-

- Passes laterally across scalenus ant & phrenic N.
- divides into 2 branches → superficial & deep branches:
 - sup. br. → disappear deep to trapezius supplying it.
 - deep br. → descend along medial border of scapula to share in anastomosis around scapula.

* COSTO-CERVICAL TRUNK :

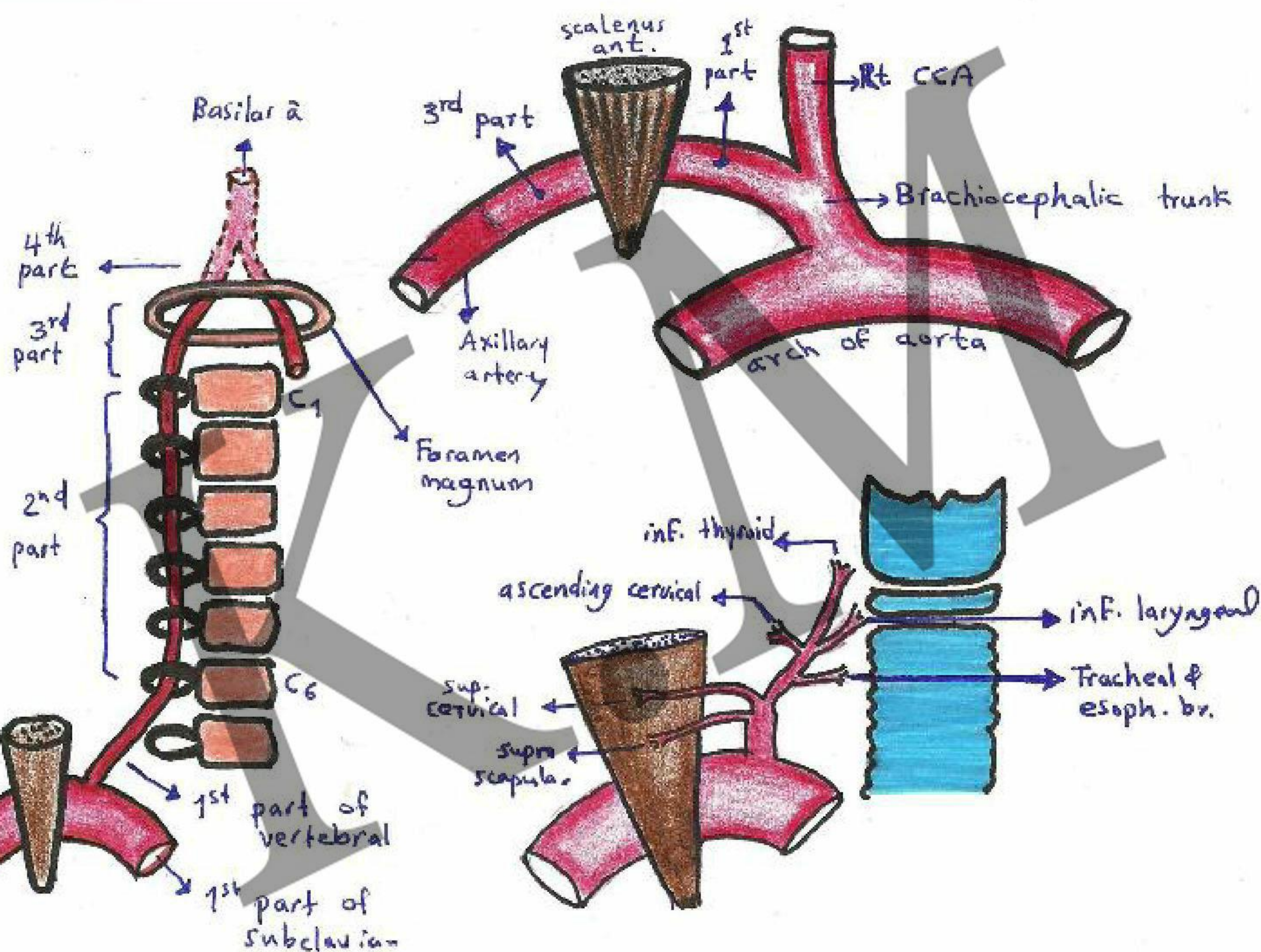
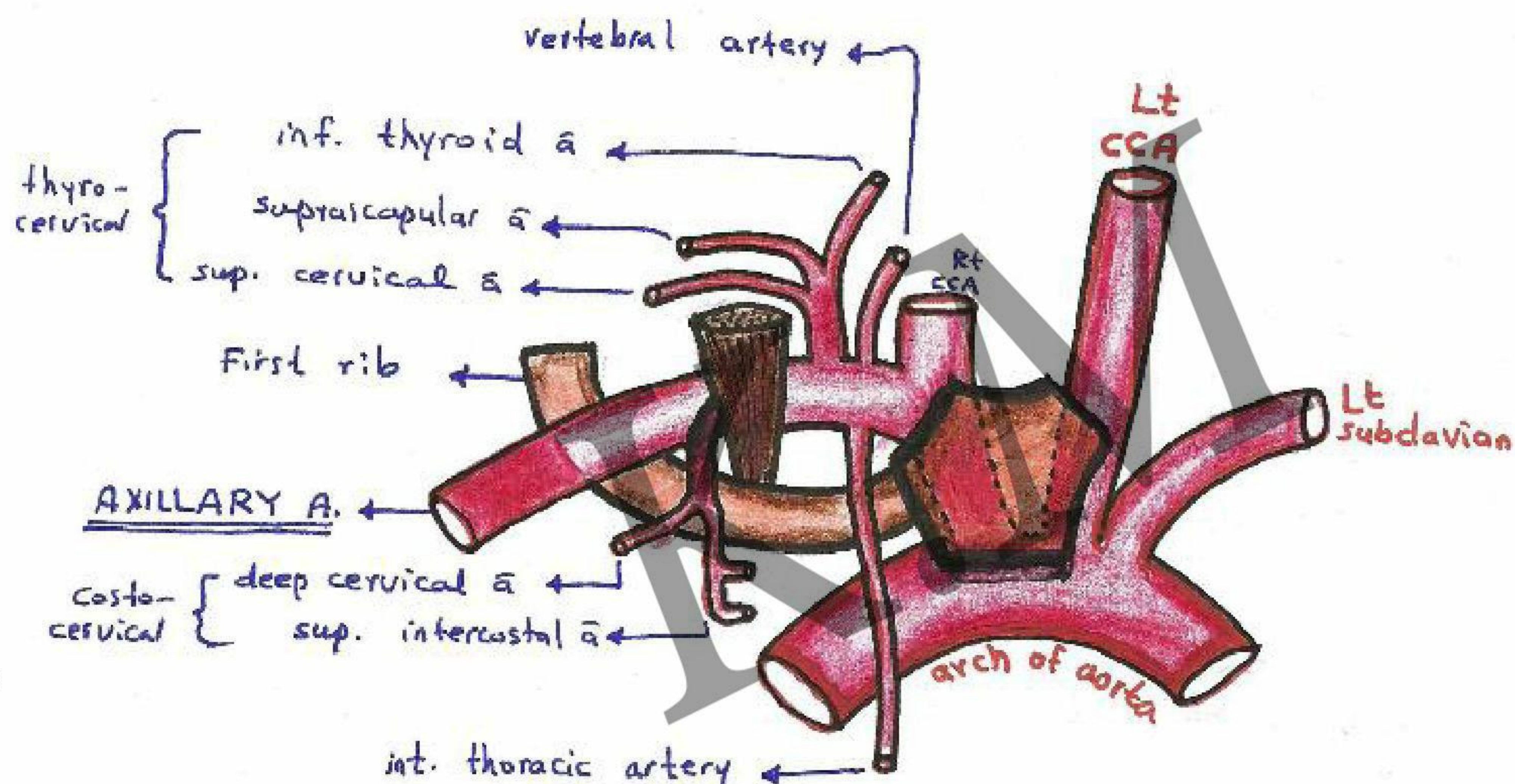
* **origin** :- arise from 2nd part of subclavian artery.

- runs backward above the pleura to neck of 1st rib.

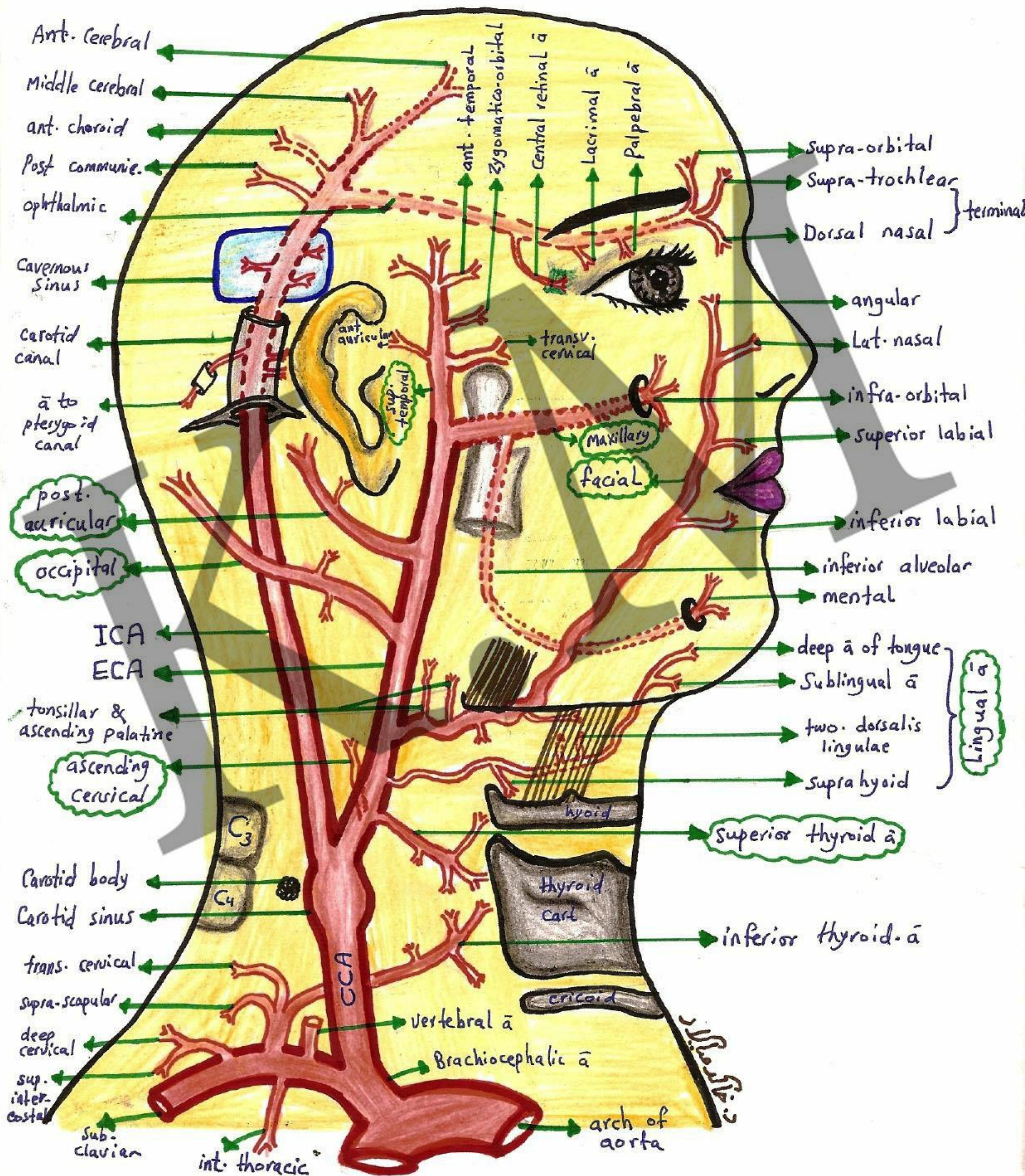
* **Branches** : ① superior intercostal a which gives. post. intercostal arteries to the 1st & 2nd spaces.

② deep cervical a : supply muscles of back & neck.

SUBCLAVIAN A.



ARTERIAL SUPPLY OF H&N



COMMON CAROTID ARTERY

* ORIGIN :-

- The left CCA arise from arch of aorta .
- The Right CCA arise from brachiocephalic (innominate) artery .

* END :-

- The CCA ends on both sides by dividing into two terminal branches (ICA & ECA) at the level of upper border of thyroid cartilage in the neck (i.e at the level of the disc between C₃ - C₄).

* COURSE :-

- It ascends in the neck upwards & backwards covered by sternomastoid inside carotid sheath (with IJV & vagus)

* N.B. CAROTID SINUS :- is a dilatation in the bifurcation of the CCA contains baroreceptors (sensitive to changes in the blood pressure) & supplied by 9th - glossoph. nerve.

- CAROTID BODY :- is an oval cellular body (< 1/2 cm) behind carotid sinus, contains chemo-receptors (sensitive to changes in the PH & CO₂) — supplied by 9th - glossoph. nerve

* Relation :-

ant. (superf.)	post. (deep)	Medial	lateral
- skin, sup. fascia, deep F. - Sternohyoid, st. thyroid, st. mastoid - thyroid gland (lobe), middle & sup. thyroid veins. - sup. belly of omohyoid	- Symp. chain - transverse process of C₅ - C₆ & prevert muscles. - inf. thyroid artery & vertebral artery - thoracic duct in left side.	- Trachea & esoph. (in lower part) - larynx & pharynx (in upper part)	- IJV - vagus.

* BRANCHES :- terminal br. are ECA & ICA

EXTERNAL CAROTID ARTERY

* ORIGIN :-

- One of the 2 terminal br. of CCA (disc between C₃, C₄).

* END :-

- Ends opposite neck of mandible inside parotid gland by giving maxillary & superf. temporal a (terminal br).

* COURSE :-

- Ascends in the neck beside pharynx deep to post. belly of digastric ms & enters parotid gland & ends inside it.

- The ECA is separated from ICA by

- | | |
|--------------------------------|------------------------------|
| ① Styloid process | ② - stylo-glossus ms. |
| ③ - Stylo-pharyngeus ms. | ④ - glosso-pharyngeal nerve. |
| ⑤ - pharyngeal br. of vagus n. | ⑥ - part of parotid gland. |

* RELATION :-

A Deep relation:-

- the above 6 structures which separate ECA from ICA.

B Superficial relation:-

- below level of post. belly of digastric
 - Skin, fascia, sternomastoid, hypoglossal nerve.
 - Common facial vein, lingual vein.
 - Post belly of digastric.
- above level of post. belly of digastric
 - Styloid ms. & part of parotid gland.

* BRANCHES :-

- | | |
|--------------------------|----------------------|
| ① superior thyroid a | } → From ant. aspect |
| ② Lingual a | |
| ③ - Facial a | |
| ④ - ascending pharyngeal | → From Medial aspect |

- | | |
|----------------------|----------------------|
| ⑤ Occipital a | } → From post aspect |
| ⑥ - Post. auricular | |
| ⑦ - Maxillary a | } → terminal br. |
| ⑧ - superf. temporal | |

① SUPERIOR THYROID ARTERY :-

- * Origin :- branch of ant. aspect of ECA below greater horn of hyoid.
- * End :- inside thyroid gland.
- * Branches :-
 - ① - Infrahyoid artery.
 - ② - Muscular to sternomastoid & cricothyroid ms.
 - ③ - Superior laryngeal a (pierces thyrohyoid membrane with internal laryngeal nerve to supply larynx).
 - ④ - Glandular (terminal) br. to thyroid gland (upper $\frac{1}{3}$ of lat. lobe & upper $\frac{1}{4}$ of isthmus).

② LINGUAL ARTERY :-

- * Origin :- br. of ant. aspect of ECA opposite greater horn of hyoid.
- * End :- ends by becoming deep (profunda) artery of tongue.
- * Course & relation :- It is a tortuous artery.
 - Divided by hyoglossus ms. into 3 parts where the 2nd part behind the muscle.
- * Branches :-
 - ① - suprahyoid artery. $\longrightarrow$ from 1st part.
 - ② - Two dorsalis lingulae a $\longrightarrow$ from 2nd part.
 - ③ - Sublingual a (glandular $\rightarrow$ sublingual)
 - ④ - Deep (profunda) artery of tongue $\} \longrightarrow$ from 3rd part

③ FACIAL ARTERY :-

- * Origin :- br. of ant. aspect of ECA above greater horn of hyoid.
- * End :- ends by becoming angular artery (continuation of a).
- * Course & relation :- It is a tortuous artery.
 - ** In the Neck : ascends vertically deep to stylohyoid & post. belly of digastric & angle of mandible

- The facial a. makes a groove at submand. gland, then enters between the gland & mandible (in submand. triangle).
- enters the face at antero-inferior angle of masseter.

** In the face:-

- ascends obliquely from angle of masseter to angle of mouth
- then vertically from angle of mouth to angle of eye becoming angular artery.

* Branches:-

- | | | | |
|------------------------|------------|-------------------|------------|
| ① ascending palatine | } in neck. | ⑤ inferior labial | } in face. |
| ② Tonsillar br. | | ⑥ Superior labial | |
| ③ submental a. | | ⑦ lateral nasal | |
| ④ Glandular (submand.) | | ⑧ angular artery | |

④ ASCENDING PHARYNGEAL:-

- * Origin:- arise from medial aspect of ECA.
- * End:- by giving inf. tympanic a. to middle ear.
- * Course:- Ascends in neck beside pharynx.
- * Branches:- ① pharyngeal :- to wall of pharynx.
② Tonsillar br.
③ inf. tympanic to middle ear.

⑤ OCCIPITAL ARTERY:-

- * Origin:- from post. aspect. of ECA.
- * End:- by giving terminal occipital branches.
- * Course:- 1st part: under post. belly of digastric 2nd part: medial to mastoid process
3rd part: in apex of occipital Δ 4th part: under trapezius (pierces it).
- * Branches:- ① mastoid br.
② descending br. that anastomose with deep cervical a.
③ occipital branches (terminal).



⑥ POST. AURICULAR A. :-

- * Origin:- from post. aspect of ECA, above post. belly of digastric
- * Course:- runs backward along the upper border of " " " " accompanied by post. auricular nerve behind auricle → scalp
- * Branches:- ① Stylomastoid br. (enters stylom. foramen) → supply inner ear
② terminal branches to back of scalp.

⑦ SUPERFICIAL TEMPORAL :-

- * Origin:- terminal br. of ECA inside parotid gland (neck of mandible).
- * End:- ends by giving ant (Frontal) & post (parietal) br. in scalp.
- * Course:- arise from ECA & ascends emerging from upper pole of thyroid gland crossing root of zygomatic arch.
- * Branches:- ① Transverse facial a (runs below zygomatic arch & emerge from ant. border of parotid gland).
② glandular (to parotid).
③ Zygomatic-orbital a.
④ ant. auricular a.
⑤ Middle (temporal) a.
⑥ Anterior (frontal) a
⑦ Posterior (parietal) a } terminal.

⑧ MAXILLARY ARTERY :- discussed before.

CRANIAL CAVITY

- The brain is covered inside the cranial cavity by the 3 meninges (Dura, arachnoid & pia mater) (from out to in).
- The dura mater consists of 2 layers (outer & inner).
- the two layers of dura separated in some places to form the dural venous sinuses
- When the two inner layers of dura mater meet (duplication of inner layer) it forms dural fold

DURAL FOLDS:

- they are duplication of inner layer of dura mater.
- Types:-

① Falx cerebri.	} vertical.
② Falx cerebelli.	
③ Tentorium cerebelli.	} horizontal.
④ Diaphragma sellae.	
⑤ Cavum trigeminale.	

① FALX CEREBRI :-

* Definition:- fold of dura bet. Rt & left cerebral hemispheres
 - it is a sickle shaped fold. (apex anterior).

* Attachment & venous sinuses related:-

- 1- apex :- attached to crista galli & contains no sinus.
- 2- base :- " " tentorium cerebelli & contains straight sinus.
- 3- upper (convex) border :- attach to sup. sagittal sulcus & contains the sup. sagittal sinus.
- 4- lower (concave) (free) border :- contains inferior sagittal sinus.

② FALX CEREBELLI :-

* Definition:- fold of dura bet. Rt & left cerebellar hemispheres
 - It is a triangular in shape. (apex below)

* attachment & sinuses related:-

- 1- apex :- reaches foramen magnum.
- 2- base :- to tentorium cerebelli.
- 3- ant. border :- free border.
- 4- Posterior border: attached to internal occipital crest & contains the → occipital sinus.

③ TENTORIUM CEREBELLI :-

* Definition:- fold of dura between cerebellum (below) & cerebrum (above).
 - It is tent-shaped (apex above).

* attachment & sinuses related:-

- 1- Outer (attached) border : attached to transverse ^{& sup. petrosal & post. clinoid process} sulcus. ~~Be~~
 Contains transvers sinus & superior petrosal sinus.
- 2- Inner (free) border ^{u-shaped} attached only at ends of the U-shape to the ant. clinoid process

④ CAVUM TRIGEMINALE :-

* Definition: fold of dura that covers the trigeminal ganglion in the middle cranial fossa.

⑤ DIAPHRAGMA SELLAE :-

* Definition: fold of dura at sella turcica roof, above the pituitary gland (pierced centrally by infundibulum)
 - attached to the 4 clinoid processes.
 - Contains the ant. & post. intercavernous sinuses in the ant. & post borders respectively.

DURAL SINUSES

* **Definition:** venous channels bet. outer & inner layers of dura.

* **Types:-**

single sinuses	paired sinuses.
① sup. sagittal sinus.	① sphenoparietal sinus.
② inf. " "	② sup. petrosal sinus.
③ straight sinus.	③ inf. petrosal sinus.
④ intercavernous sinuses (ant., middle & post.).	④ cavernous sinus.
⑤ basilar sinus	⑤ sigmoid sinus.
⑥ occipital sinus	⑥ transverse sinus.

* CAVERNOUS SINUS :-

* **Definition:-** it is a dural venous sinus in middle cranial fossa (on each side of body of sphenoid).

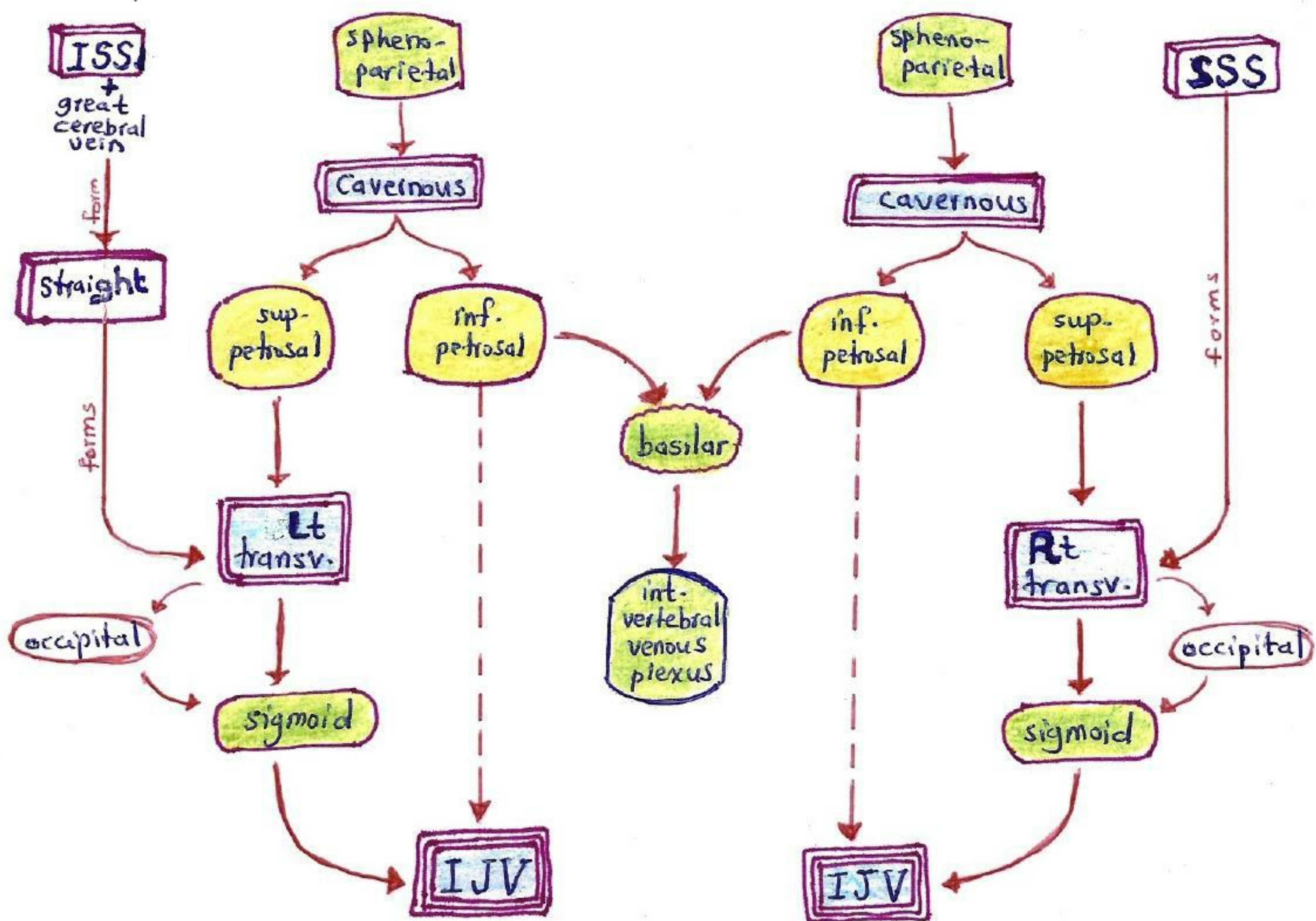
* **Tributaries & communication:-**

- It receives ^{anteriorly} sphenoparietal sinus & ophthalmic veins (sup. & inf.).
- It gives posteriorly superior & inferior petrosal sinuses (to transverse and int. jugular vein - respectively).
- It communicates with each other by intercavernous sinuses.
- It communicates with pterygoid plexus inferiorly by emissary veins.

* **Relations:-**

- ① anteriorly :- superior orbital fissure.
- ② posteriorly :- petrous temporal bone.
- ③ laterally :- trigeminal ganglion & uncus of temporal lobe of brain.
- ④ Medially :- pituitary gland, body of sphenoid & sphenoidal air sinus.
- ⑤ superiorly :- Internal carotid artery.
- ⑥ inferiorly :- body of sphenoid & sphenoidal air sinus.
- ⑦ Inside the sinus :- ICA & abducent nerve (Lat. to ICA).
- ⑧ At Lateral wall :- oculomotor ③, trochlear ④, } from above down.
ophthalmic & maxillary n. ⑤

Communication of sinuses



*NERVE SUPPLY OF DURA:

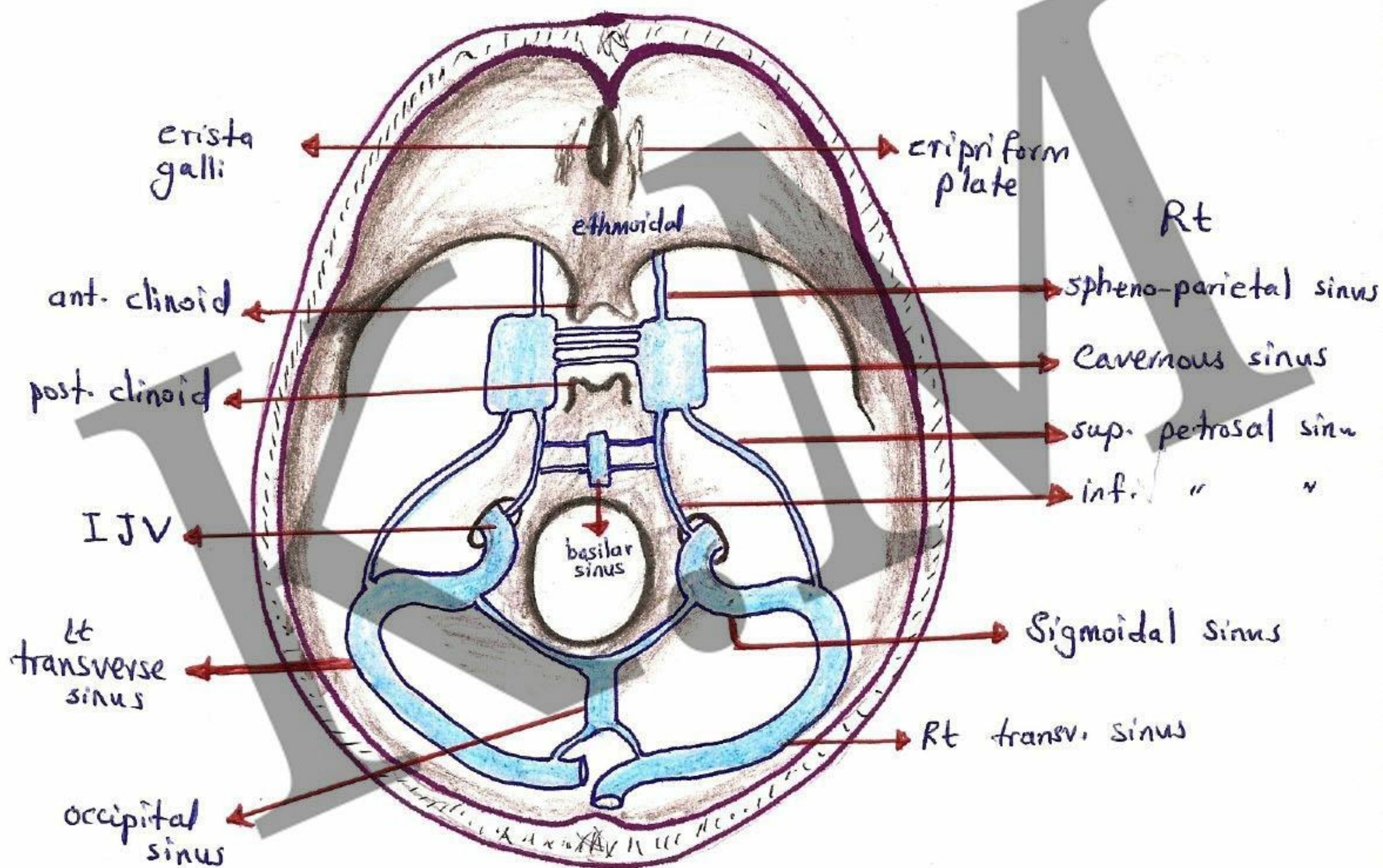
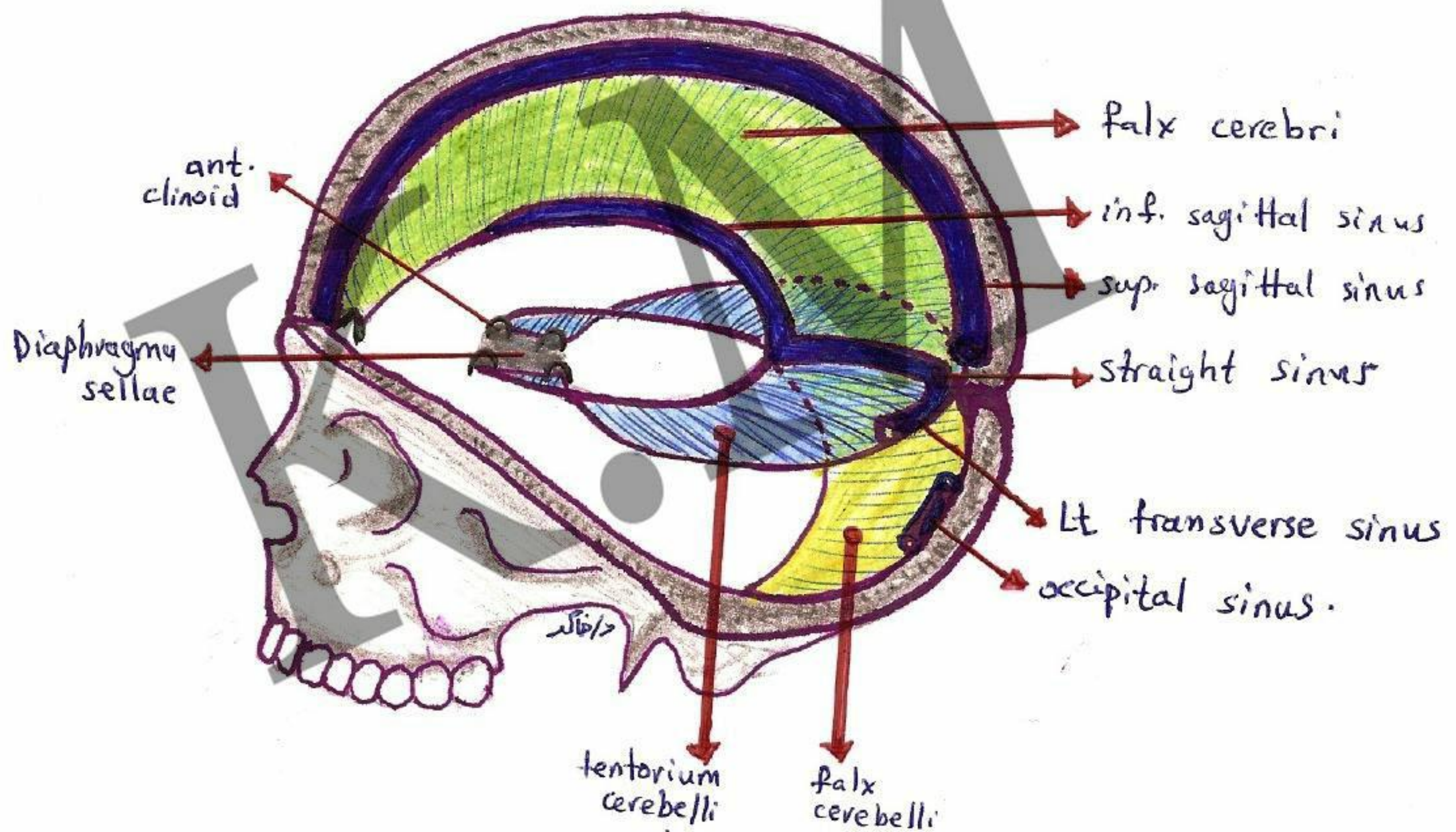
- (A) above tentorium → by meningeal br. of trigeminal nerve
- meningeal br. of ophthalmic → ant. cranial fossa.
 - " " " maxillary & mandibular → middle cranial fossa.
- (B) below tentorium → meningeal br. of 9, 10 & 12 cranial nerves.
- around F. magnum by C₁, C₂, C₃. (cervical).

*ARTERIAL SUPPLY OF DURA by meningeal brs. of

- 1- int. carotid a. } → in ant. & middle cranial fossa
- 2- Middle meningeal a. }
- 3- Accessory " " → in middle fossa
- 4- vertebral a. } → in post. cranial fossa
- 5- occipital a. }
- 6- ascending pharyngeal → in post. & middle fossae.

(51)

"folds & Sinuses of dura"



PITUITARY GLAND

* **Site** :- in sella turcica (hypophyseal fossa). oval in shape.

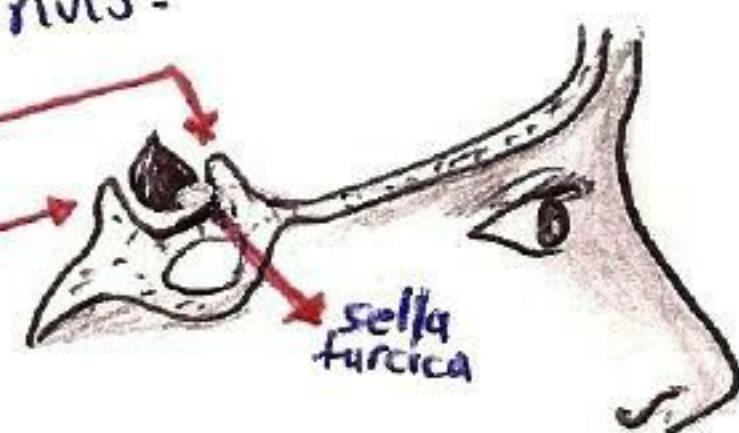
* **Relation** :- above :- diaphragma sellae (separating it from optic chiasma).

below :- sphenoidal body & air sinus.

anterior :- tuberculum sellae.

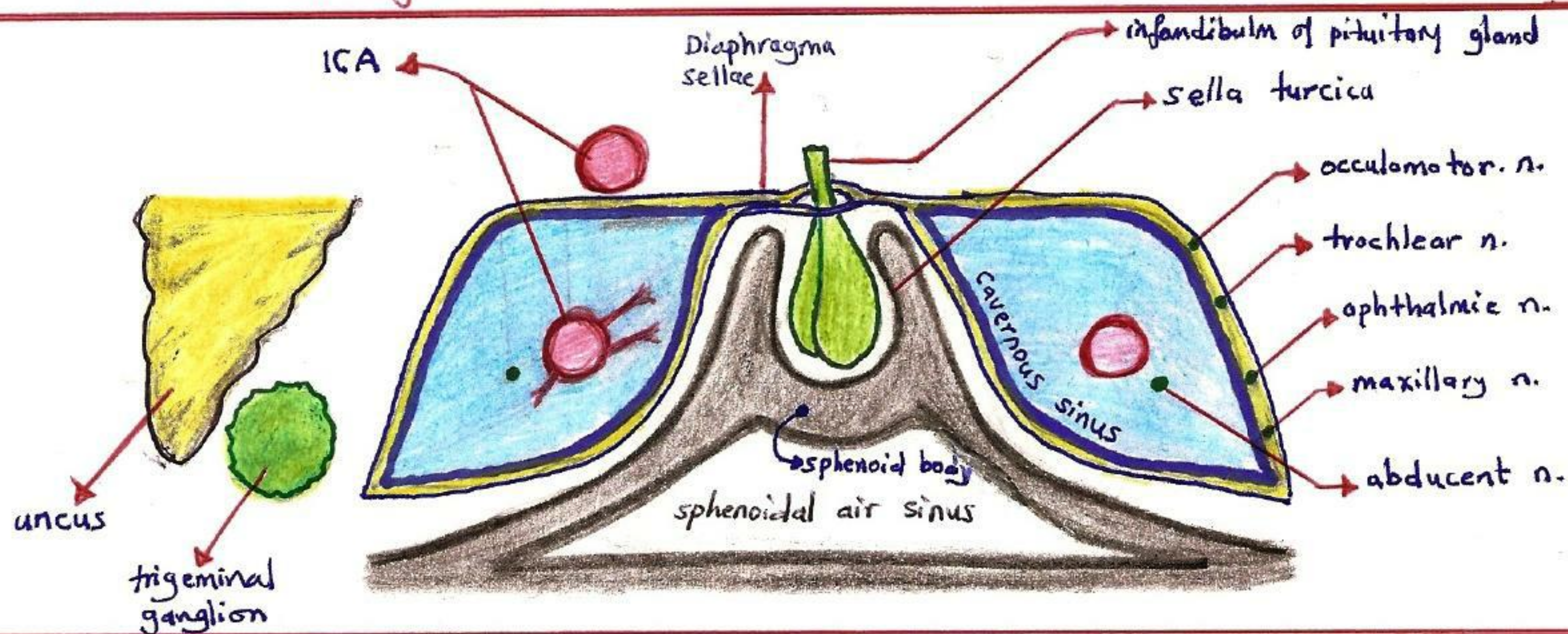
posterior :- Dorsum sellae

on each side :- Cavernous sinus.



* **Arterial supply** :- superior & inferior hypophyseal a (from I.C.A.).

* **Venous drainage** :- into cavernous & intercavernous sinuses.



*** NOTES :-

NB :- The Right transverse sinus is a continuation of sup. sagittal sinus while Left transverse sinus is a continuation of straight sinus.

NB :- The **Diploic veins** are thin-walled, valveless veins in diploe of skull and communicate with dural sinuses & meningeal veins.

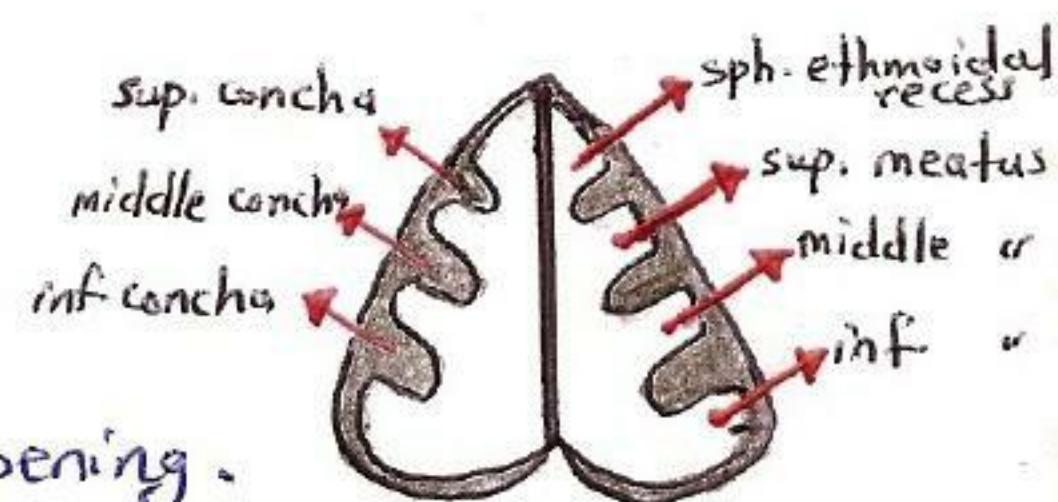
Nasal Cavity

- The nasal septum divides the nasal cavity into Rt & Lt halves & each cavity having ant. aperture (nares, nostrils) and post. aperture (choana) into nasopharynx.

* BOUNDARIES:

- Floor** :- formed by hard palate.
- Roof** :- formed from forward to backward by:
 - Nasal bone, (2) cribriform plate of ethmoid (3) sphenoid body
- Medial wall** :- anteriorly → septal cartilage
 - Postero-superior → Perpendicular plate of ethmoid.
 - Postero-inferior → Vomer bone.
 } → nasal septum.
- Lateral wall** :- formed by 3 ^{bony} elevations (conchae) & 3 depression (meatuses) into which the paranasal sinuses open.

* NASAL MEATUSES :- spaces between conchae.



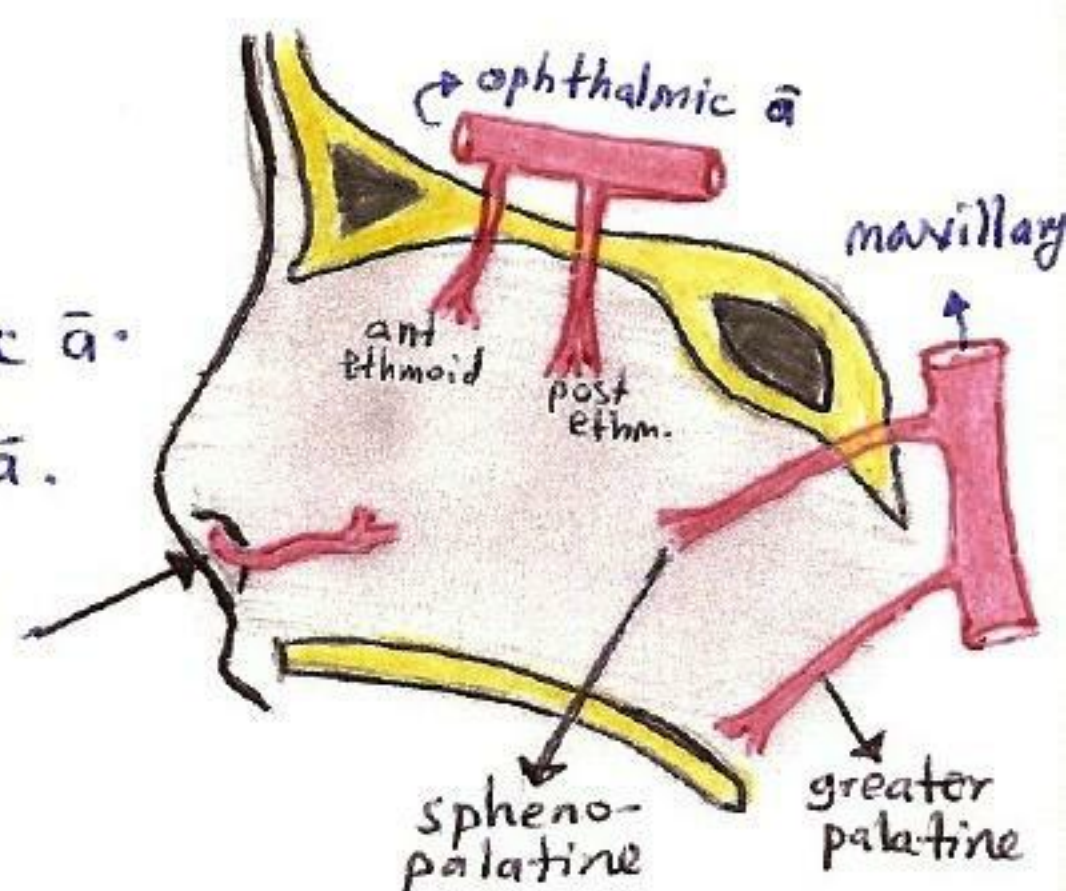
- inferior meatus** :- below inf. concha.
 - receives nasolacrimal duct opening.
- Middle meatus** :- below middle concha, consists of.
 - bulla ethmoidalis : elevation → receive middle ethmoidal air sinus.
 - hiatus semilunaris : groove below bulla → receive
 - ant. ethmoidal sinus
 - Frontal
 - maxillary sinus.
- Superior meatus** :- below superior concha,
 - receives post. ethmoidal air sinus.
- Spheno-ethmoidal recess** :- above sup. concha (below roof of skull)
 - receives sphenoidal air sinus.

*** BLOOD SUPPLY :****① Arterial supply :** by

- ant & post. ethmoidal → from ophthalmic a.
- greater palatine & sphenopalatine → maxillary a.
- septal br. of superior labial → facial a.

② Venous drainage :

- corresponds to the arteries.

*** LYMPH DRAINAGE :**

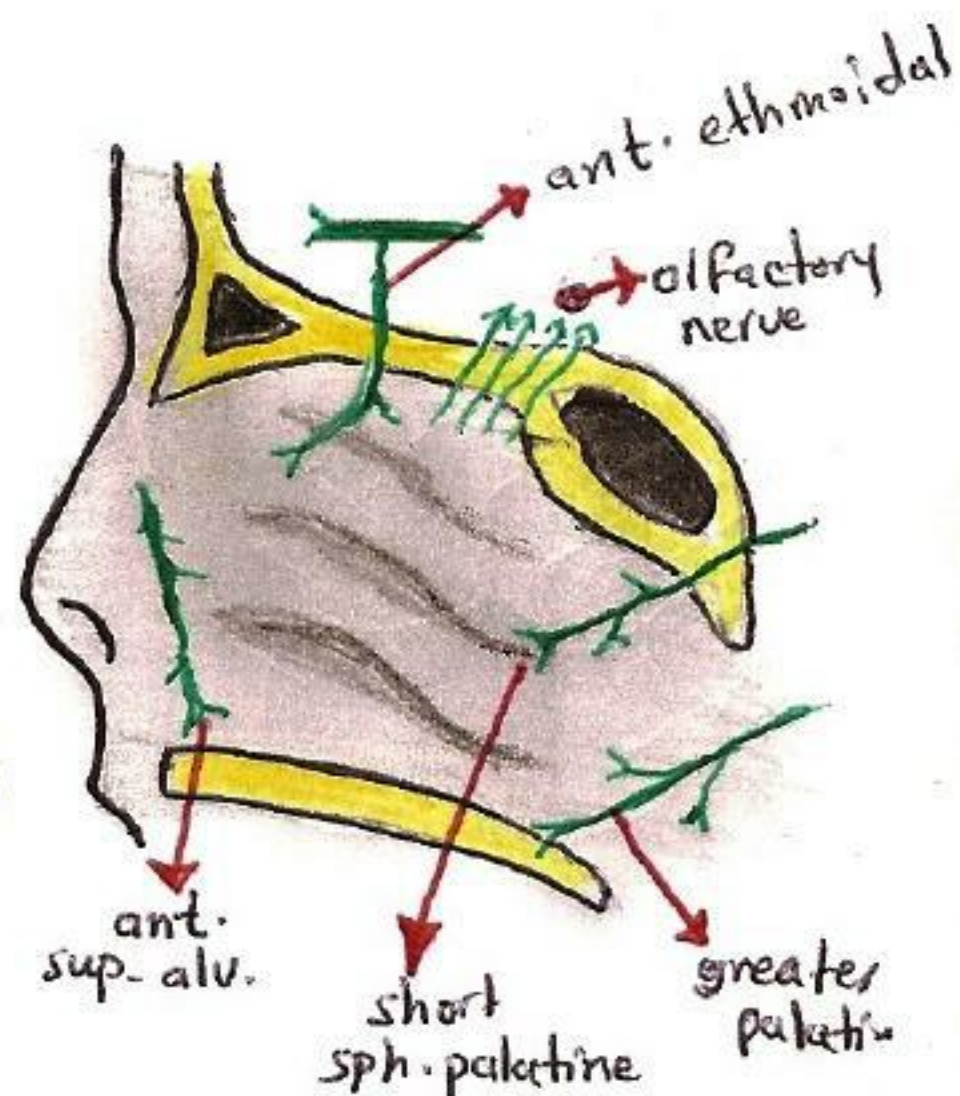
- ① anterior part → submandibular LN.
- ② posterior part → retropharyngeal & upper deep cervical LN.

*** NERVE SUPPLY :****① Lateral wall :**

- (A) special sensation :- olfactory nerves (smell)
- (B) General (trigeminal) by ① ant. ethmoidal, ② greater palatine, ③ short sphenopalatine & ④ ant. superior alveolar nerve (infraorbital n.)

② Medial wall :

- (A) special sensation (smell) :- olfactory nerve.
- (B) General (by trigeminal N) by ① ant. ethmoidal, ② long sphenopalatine ③ short sphenopalatine

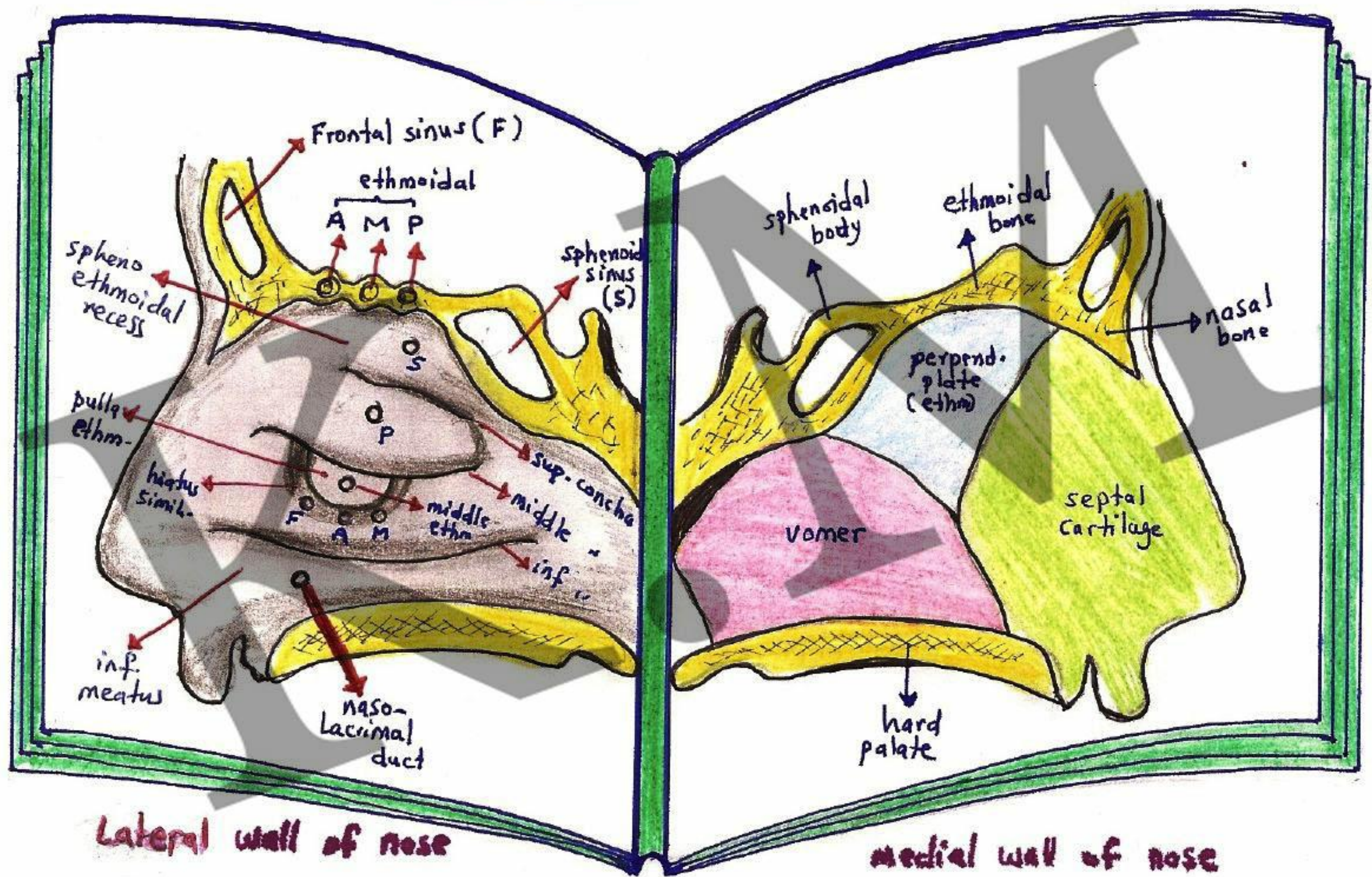


PARA-NASAL SINUSES : are air filled spaces inside skull include ① sphenoidal air sinus ② maxillary. ③ Frontal. ④ ethmoidal (ant. middle & post).

They open in the lat. wall of nasal cavity (in meatuses)

- * Function :**
- ① decrease skull weight
 - ② gives resonance to voice.
 - ③ warm & humidify air.
 - ④ Protect brain against temp. changes.

NASAL CAVITY



- N.B. -
- Superior concha is the smallest & usually fuses posteriorly with middle concha (it is usually not seen from ant. nares).
 - Superior & middle conchae are parts of ethmoidal bone.
 - Inferior concha is the largest & is a separate bone.

ORAL CAVITY

- The oral cavity is divided into: vestibule & oral cavity proper.

*** VESTIBULE:** (Labial cavity):

- The space between gums (internally) & lips and cheeks (externally).

*** ORAL CAVITY PROPER:** (buccal cavity):

* Roof: - Palate (hard & soft).

* Floor: - Tongue (with sublingual gland & mylohyoid ms under mucosa)

* Sides: - Teeth.

THE PALATE:

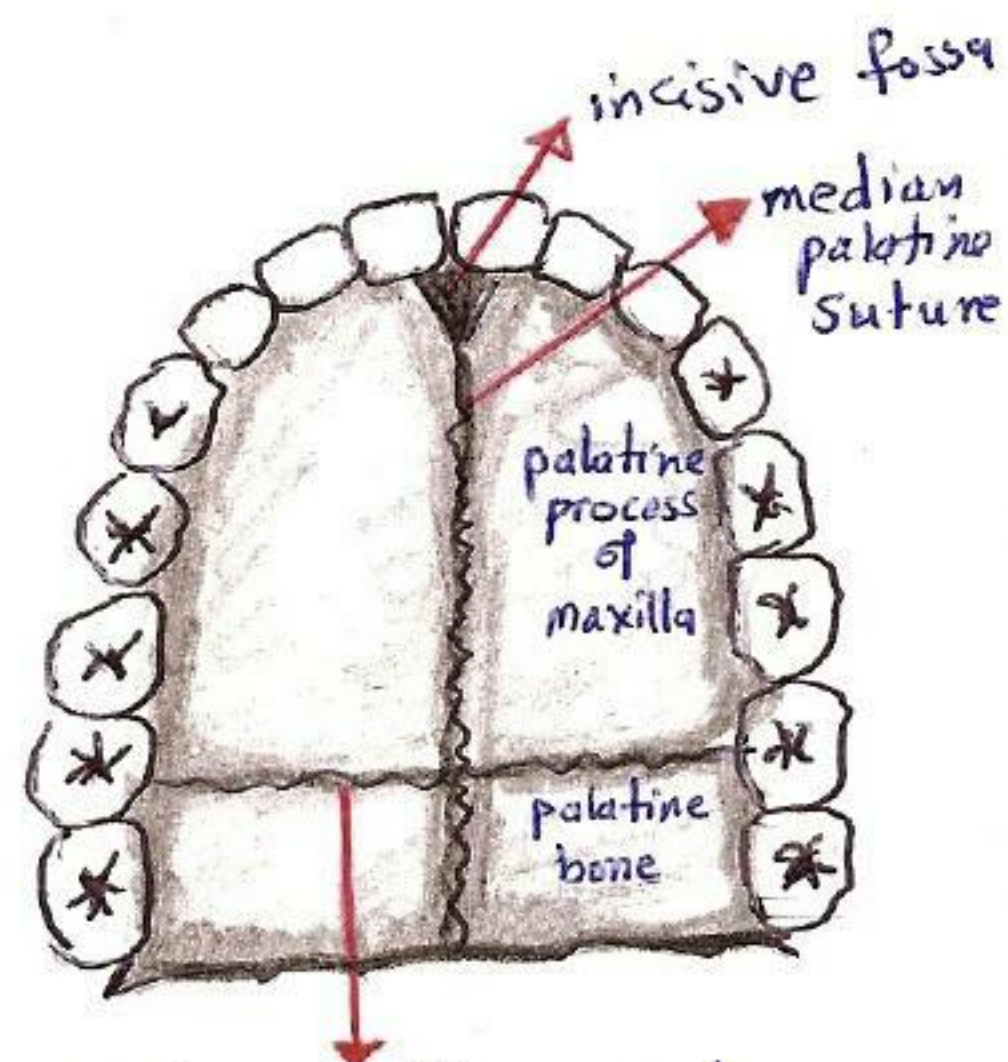
*** ① HARD PALATE:** formed of:-

1. Palatine processes of maxilla (ant. $\frac{3}{4}$).

2. horizontal plate of palatine bone (post $\frac{1}{4}$).

• The hard palate is divided into Rt & Lt by median palatine suture (ends anteriorly into incisive fossa).

• The ant $\frac{3}{4}$ & post $\frac{1}{4}$ unite at the palatamaxillary sulcus.



*** ② SOFT PALATE:** formed of

1. Palatine aponeurosis (aponeurosis of tensor palati ms attaching to post. free border of hard palate & gives attachment of all ms).

2. Palatine muscles (① Levator palati, ② Tensor palati, ③ palatoglossus & ④ Palato-pharyngeus)

*** Nerve supply of palate:-**

① * Motor: - all ms. supplied by palatine plexus (accessory cranial n. ^{through} vagus) except tensor palati supplied by mandibular n. (N. to Med. pterygoid)

② - sensory: - greater & lesser palatine and long sphenopalatine n.

* THE TONGUE :

- It is a muscular organ (formed by muscle) & covered by mucosa.
- It consists of the following parts:

① Root :- the post. part (mainly in oropharynx)

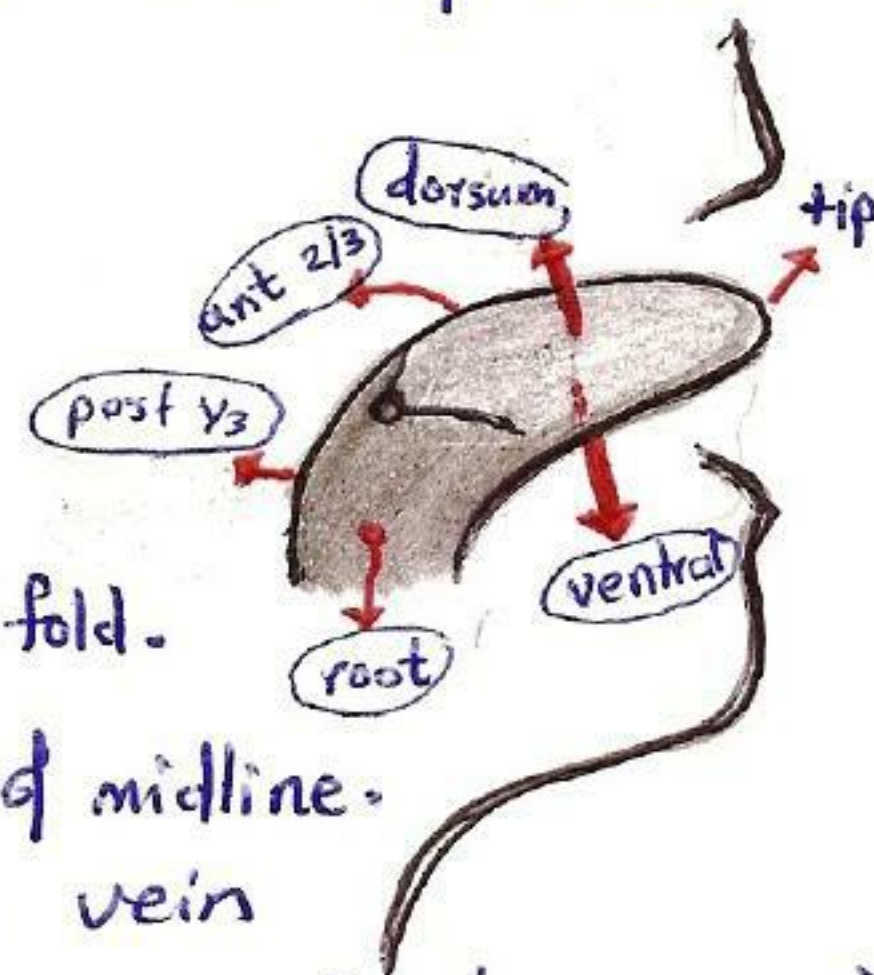
② Tips & margins :- lie opposite teeth.

③ Ventral (lower) surface :- opposite the floor.

- It shows :- frenulum Lingulae → raised midline fold.

- deep lingual vein → on each side of midline.

- fimbriated fold → lat. to the vein



④ Dorsal (upper) surface :- divided by sulcus terminalis (V-shaped groove) into ant. 2/3 & post 1/3. the apex of V-shape directed posteriorly into foramen coecum.

	ant. 2/3	post 1/3
- Name	palatine (or buccal) part	pharyngeal part
- Position	oral cavity proper	oro-pharynx
- Papillae	filiform, fungiform & vallate	No papillae
- Tonsils	No lingual tonsils	contain tonsil. - Lingual tonsil -
- Embryo-	from 1 st pharyngeal arch	from 3 rd arch
- Nerve supply	Lingual → general sensation chorda tympani → special "	glossopharyngeal for all sensation.

* Nerve supply of tongue :

① Motor : all ms. supplied by hypoglossal n. except palatoglossus ms supplied by palatine plexus (by cranial accessory n. - through vagus)

② Sensory : Ant 2/3 → Special sensation (taste) → by chorda tympani (facial)
General " → by lingual n. (mandibular - 5)

- post 1/3 → all sensation → by glosso-pharyngeal n.

* Lymphatic drainage of tongue-

- ant. 2/3
 - tip :- into submental LN.
 - sides :- into submandibular LN → upper deep cervical LN.
- Post 1/3 → all into upper deep cervical LN.

* Blood supply of tongue

- by Lingual artery (ECA) & Lingual vein (into IJV).

* Muscles of tongue

① Intrinsic ms :- supplied by hypoglossal n. include :-

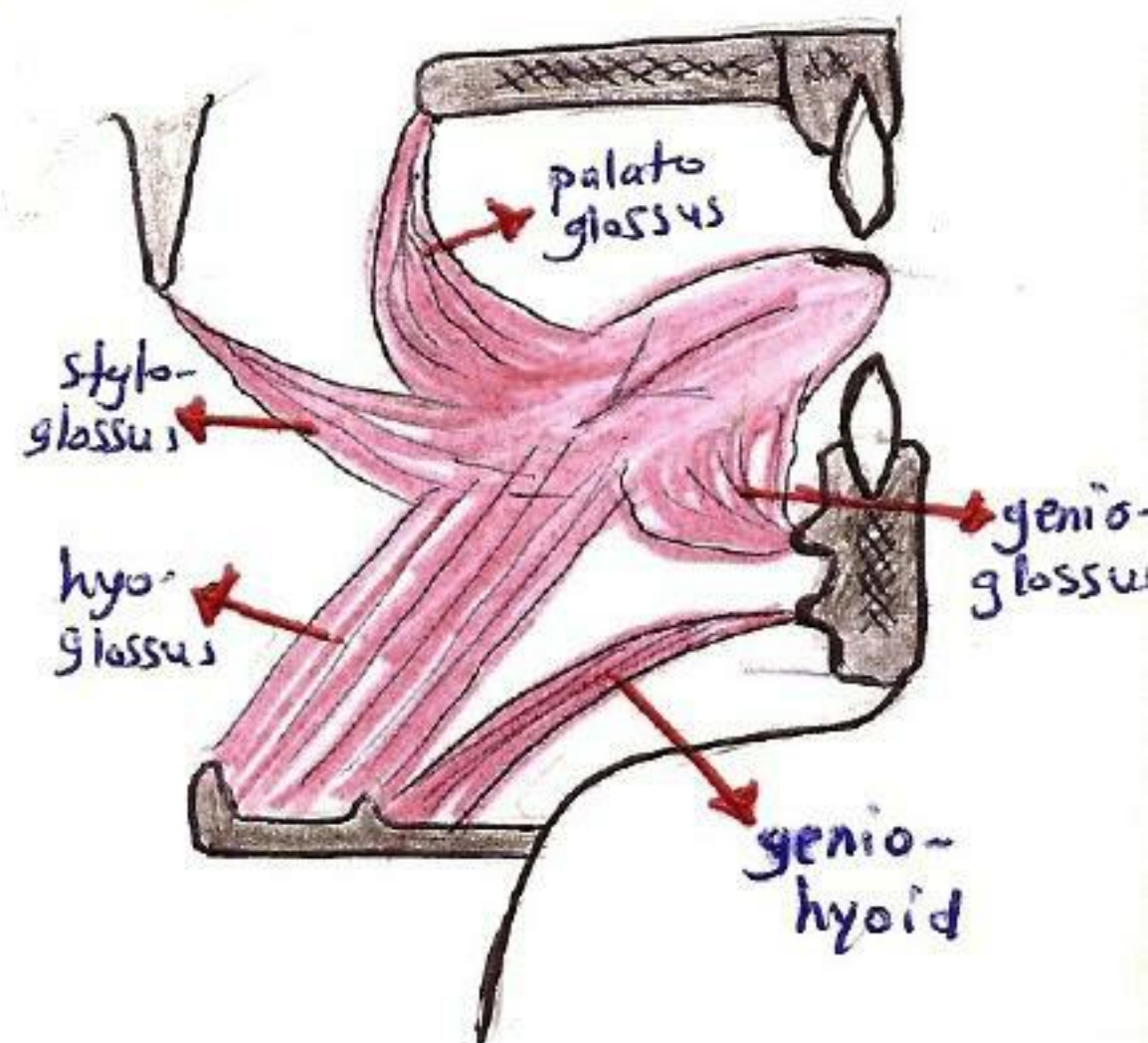
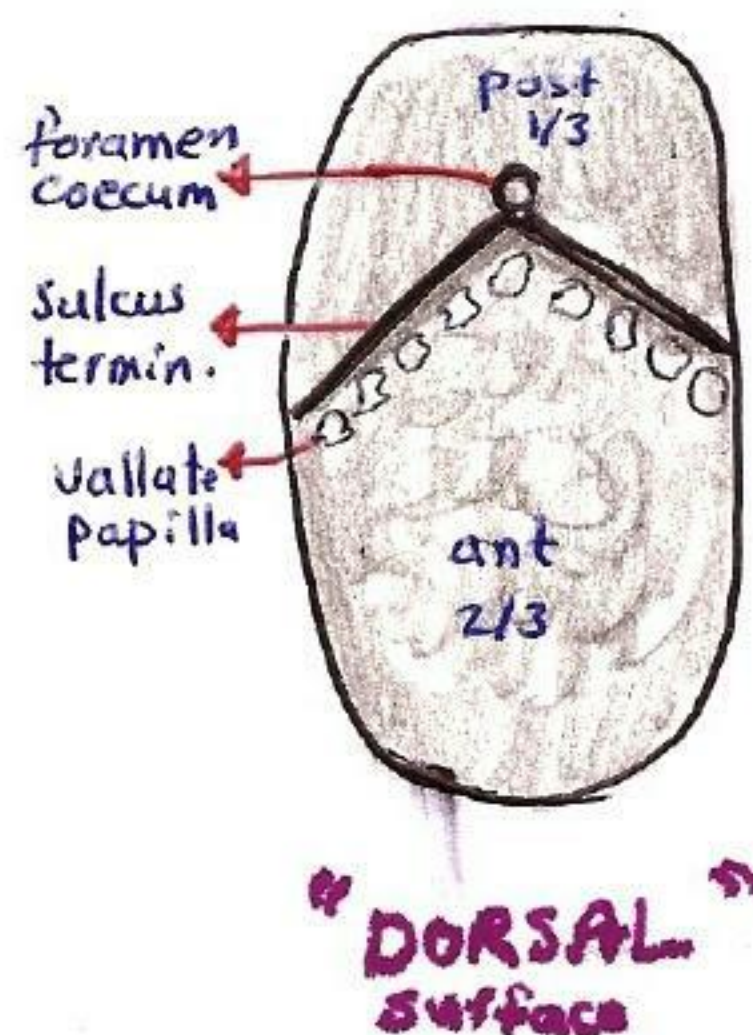
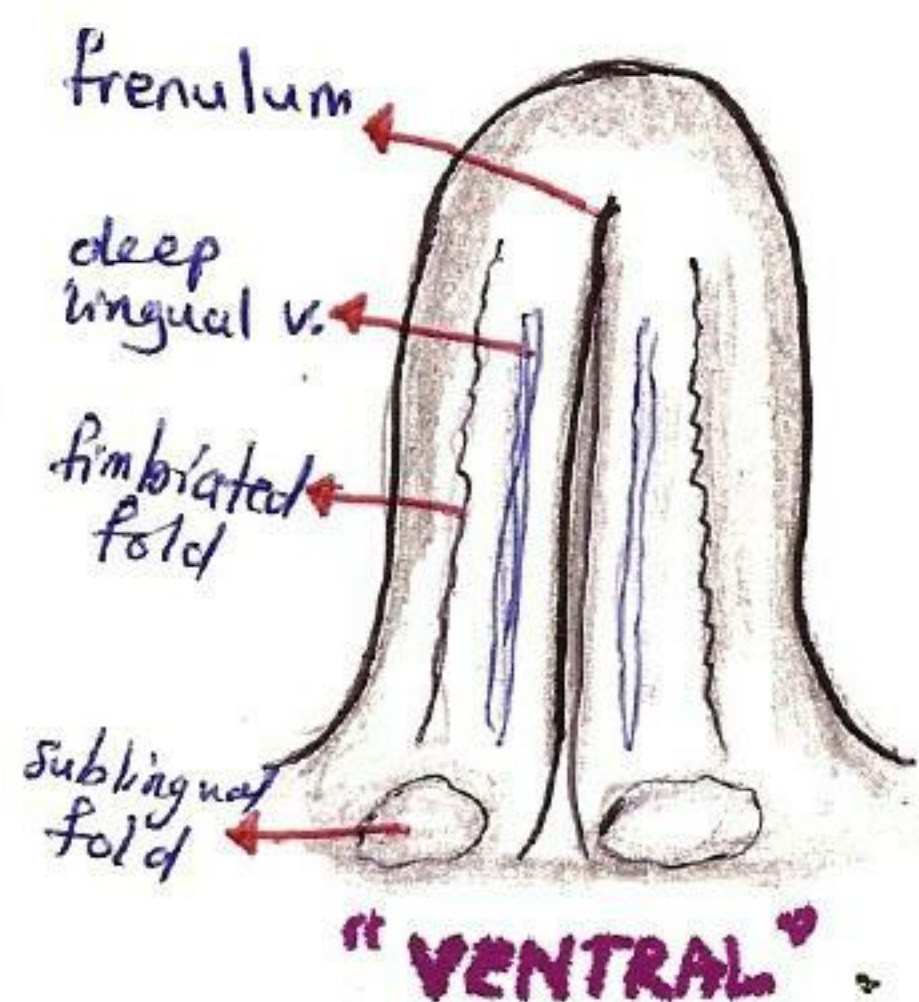
- ①- vertical ms. fibers ③- superior longitudinal ms.
②- transverse ms. " ④- inferior " " "

(B) Extrinsic ms - supplied by hypoglossal (except palatoglossus), include:

- ① Genio-glossus. ③ stylo-glossus.
② hyp-glossus ④ palato-glossus.

muscle	origin	insertion	actions
Genio-glossus	sup. genial tubercle	tongue (inferiorly)	protraction of tongue
hyo-glossus	hyoid bone	tongue (post 1/3)	depression " "
stylo-glossus	styloid process	tongue (sides)	retraction " "
palato-glossus	palatine aponeurosis	tongue (sides of post 1/3)	elevation " "

N.B: intrinsic ms. all are inside tongue & they change the shape of tongue



PHARYNX

* **DEFINITION:** - It is a funnel shaped muscular tube, starts from base of skull, ends at C₆ vertebra (becomes esoph.)

* **STRUCTURE:**

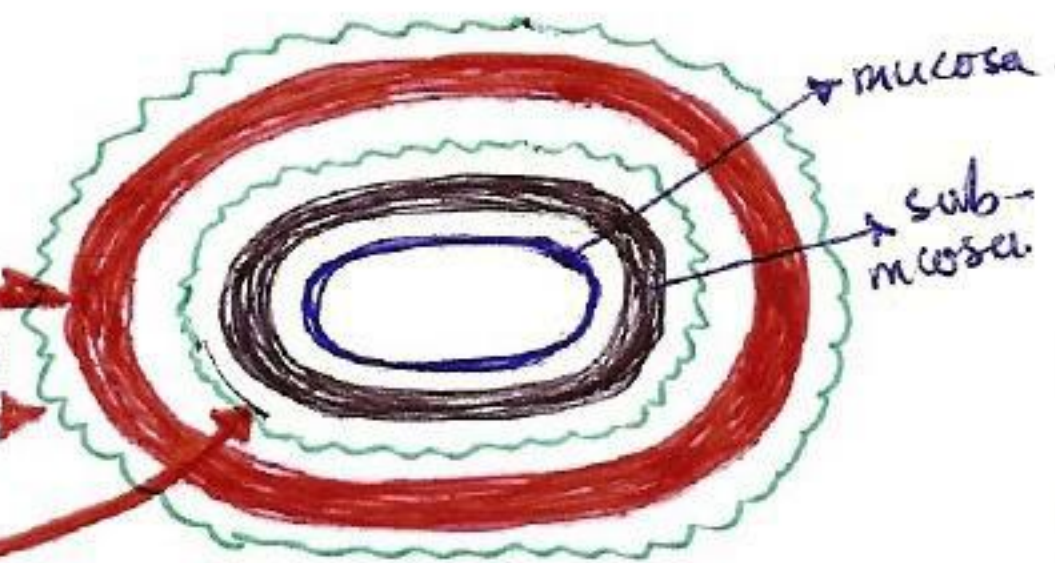
① Mucosa.

② Submucosa.

③ Pharyngo-basilar fascic

④ Pharyngeal ms.

⑤ bucco-phary. fascia



* **PHARYNGEAL MUSCLES:**

[A] Transverse : 3 constrictors (superior, middle & inferior).

[B] longitudinal : 3 pharyngeus (stylo-, Palato-, & Salpingo-pharyngeus).

* **NERVE SUPPLY:**

- ALL muscles of pharynx are supplied by pharyngeal plexus of nerves except Stylo-pharyngeus by glossopharyngeal N.

- The plexus lies on outer surface of middle constrictor.

- [N.B.] Pharyn. plexus of n. are formed by :

pharyngeal branches of

- Glossopharyngeal n. (sensory).
- Vagus n. (motor & parasymp.).
- sup. cervical ganglion (symp. & cranial part of accessory N.

* **LYMPH. DRAINAGE:**

- Into retro-pharyngeal & deep cervical L.N.

*** ARTERIAL SUPPLY :**

- 1 - Ascending pharyngeal br. of ECA.
- 2 - Ascending palatine & tonsillar br. of facial a.
- 3 - Pharyngeal brs. of superior & inferior thyroid a.

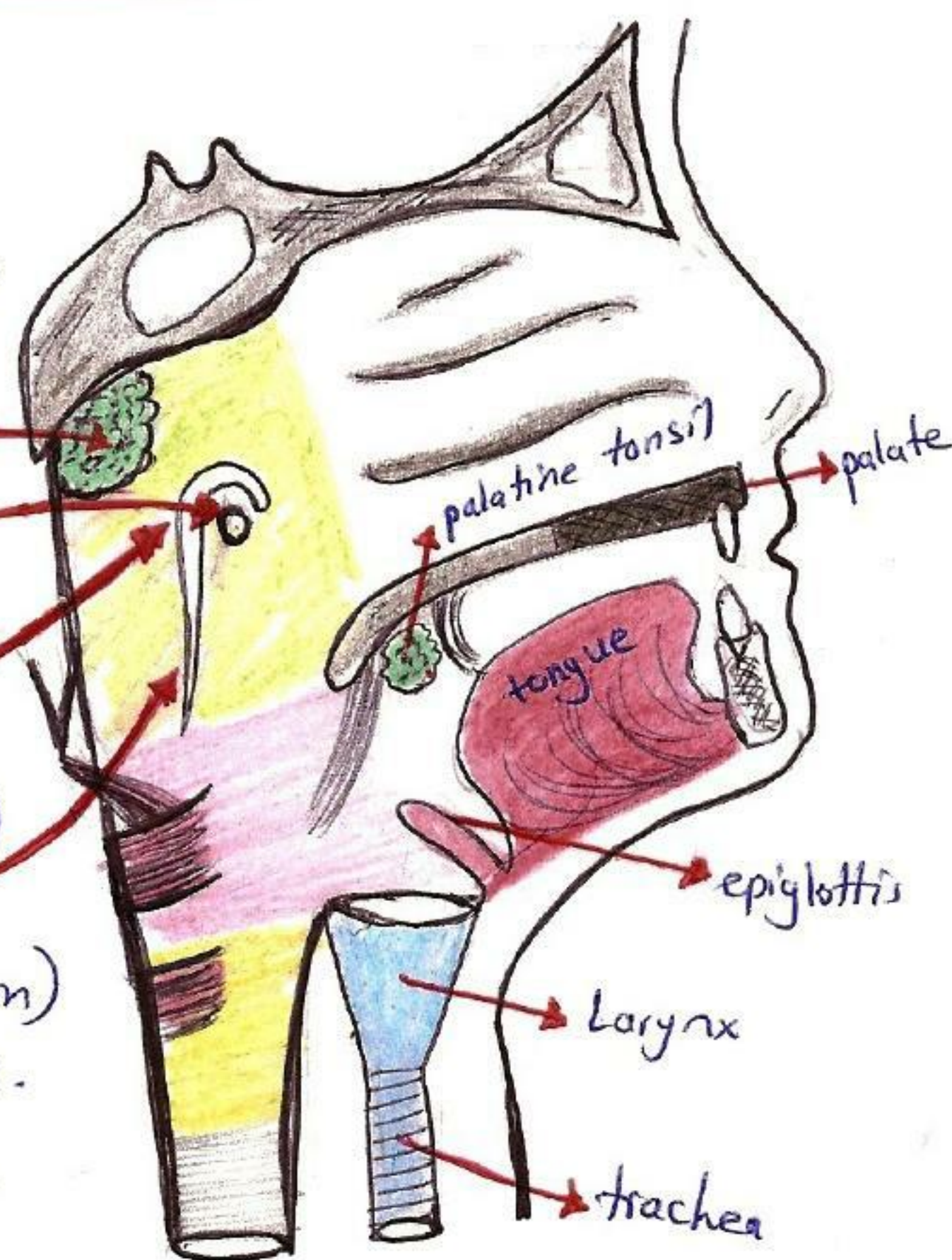
*** VENOUS DRAINAGE :**

- into Pharyngeal plexus of veins → facial & IJV.

CAVITY OF PHARYNX**(I): NASO-PHARYNX :**

- Lies behind the nasal cavity & it shows the following

- ① - Nasopharyngeal tonsil.
- ② - Opening of Eustachian tube.
(at level of inferior concha)
- ③ - Tubal elevation
(upper & post. lips of the opening)
- ④ - Salpingo-pharyngeal fold
(the lower part of tubal elevation)
- caused by salpingopharyngeus ms.
- ⑤ - Pharyngeal recess - behind the salpingo-pharyngeal fold.

**(II): ORO-PHARYNX :**

- Lies behind the oral cavity.
- having the palatine tonsils (together with ↑ nasoph. tonsils forming Waldeyer's ring)
- Palatine tonsils lies bet. Palatoglossal fold (ant) & Palato-pharyngeal fold (Post).

Lingual tonsil & the

(III) LARYNGEO-PHARYNX :

- lies behind laryngeal cavity.
- Contains fossa on either sides called "Piriformis fossa".

* STRUCTURES BETWEEN CONSTRICTORS MS. :

(A) structures bet. superior constrictor & base of skull :

- | | |
|-------------------------|-----------------------|
| ① Tensor palati ms. | ② levator palati. ms. |
| ③ Ascending palatine a. | ④ Eustachian tube |

(B) structures bet. sup. & middle constrictors :

- | | |
|------------------------|---------------------------|
| ① Stylo-pharyngeus ms. | ② glosso-pharyngeal nerve |
|------------------------|---------------------------|

(C) structures bet. middle & inferior constrictors :

- | | |
|----------------------------|------------------------------|
| ① internal laryngeal nerve | ② superior laryngeal artery. |
|----------------------------|------------------------------|

LARYNX

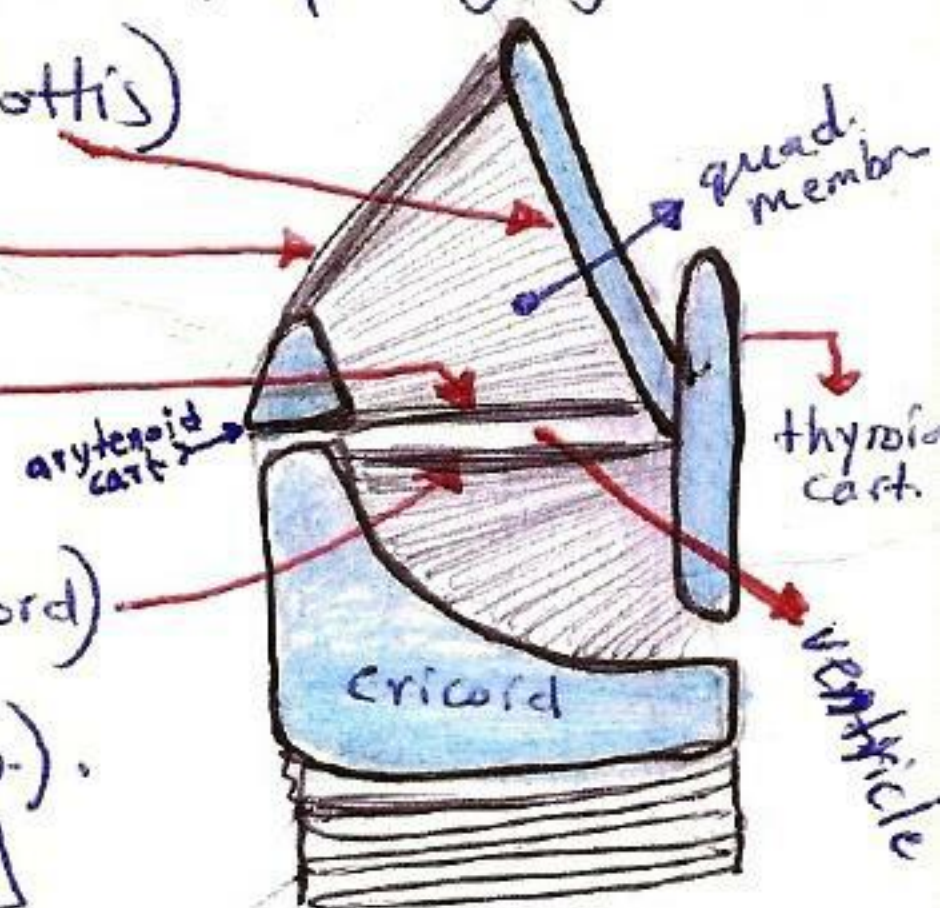
- It is a tube formed mainly by cartilage extends from epiglottis to trachea (C6 vertebra) acting as air passage & voice organ.
- It consists of ① Cartilages, connected by ② Ligaments & membranes and lined by ③ mucosa & moved by ④ muscles.

* CARTILAGE OF LARYNX: (single or paired).

- | | | | |
|-----------------|----------|---------------|-----------|
| ① Epiglottis. | } single | ④ arytenoid | } paired. |
| ② Thyroid cart. | | ⑤ Corniculate | |
| ③ Cricoid cart. | | ⑥ Cuneiform | |

* LIGAMENT & MEMBRANES:

- ① Thyro-hyoid membr. (pierced by int. laryngeal n. & sup. laryngeal a).
- ② Quadrate membr. (bet. arytenoid cart. & epiglottis)
 - it's upper border → ary-epiglottic fold.
 - it's lower border → vestibular fold (false cord)
- ③ Crico-thyroid membr. & Lig.
 - it's upper border → vocal lig. (true vocal cord)
 - (vocal cord = vocal lig covered by mucous memb.).
 - [between vocal & vestibular folds called ventricle]



* LYMPH. DRAINAGE OF LARYNX:

- the vocal cord & above → upper deep cervical LN.
- Below vocal cords → lower deep cervical LN.

NB - below vocal cord → called infraglottic compartment (above → supra-)
 NB - above vestibular fold → called vestibule.

* BLOOD SUPPLY OF LARYNX:

- ① - Superior laryngeal a (br. of sup. thyroid a).
 - ② - inferior ~ ~ (~ ~ inf. ~ ~).
- the veins corresponds to arteries.

* NERVE SUPPLY:

- [A] - MOTOR: all ms. of larynx are supplied by recurrent laryngeal n. (except crico-thyroid → by external laryngeal n.).
- [B] - SENSORY: mucosa above vocal cord → by internal laryngeal n.
 - mucosa below ~ ~ → by recurrent ~ ~ .
- N.B.: recurrent laryngeal is br. of vagus (also called inf. laryngeal)
 - int. & ext ~ ~ ~ superior laryngeal (br. of vagus)

* MUSCLES OF LARYNX:

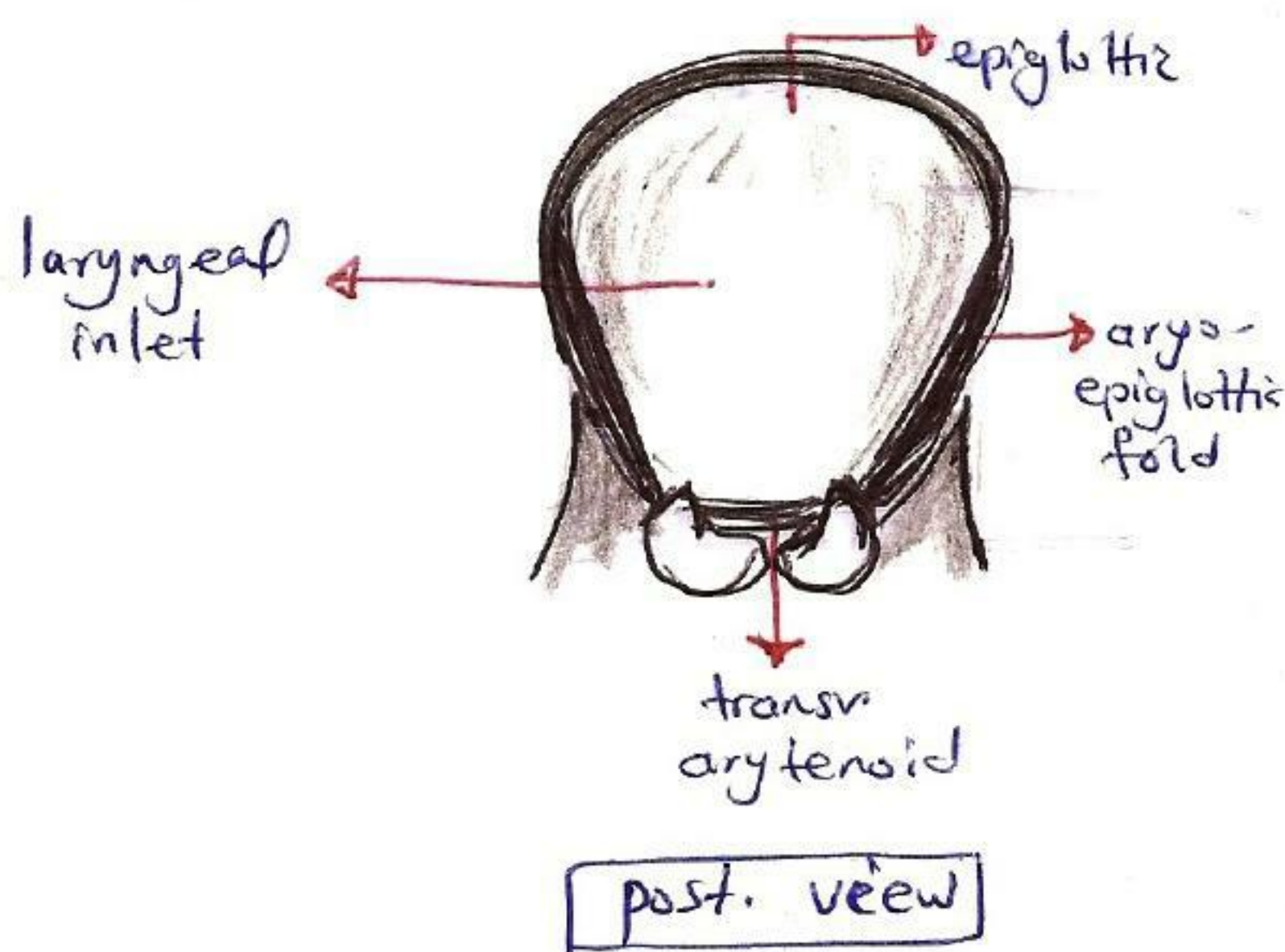
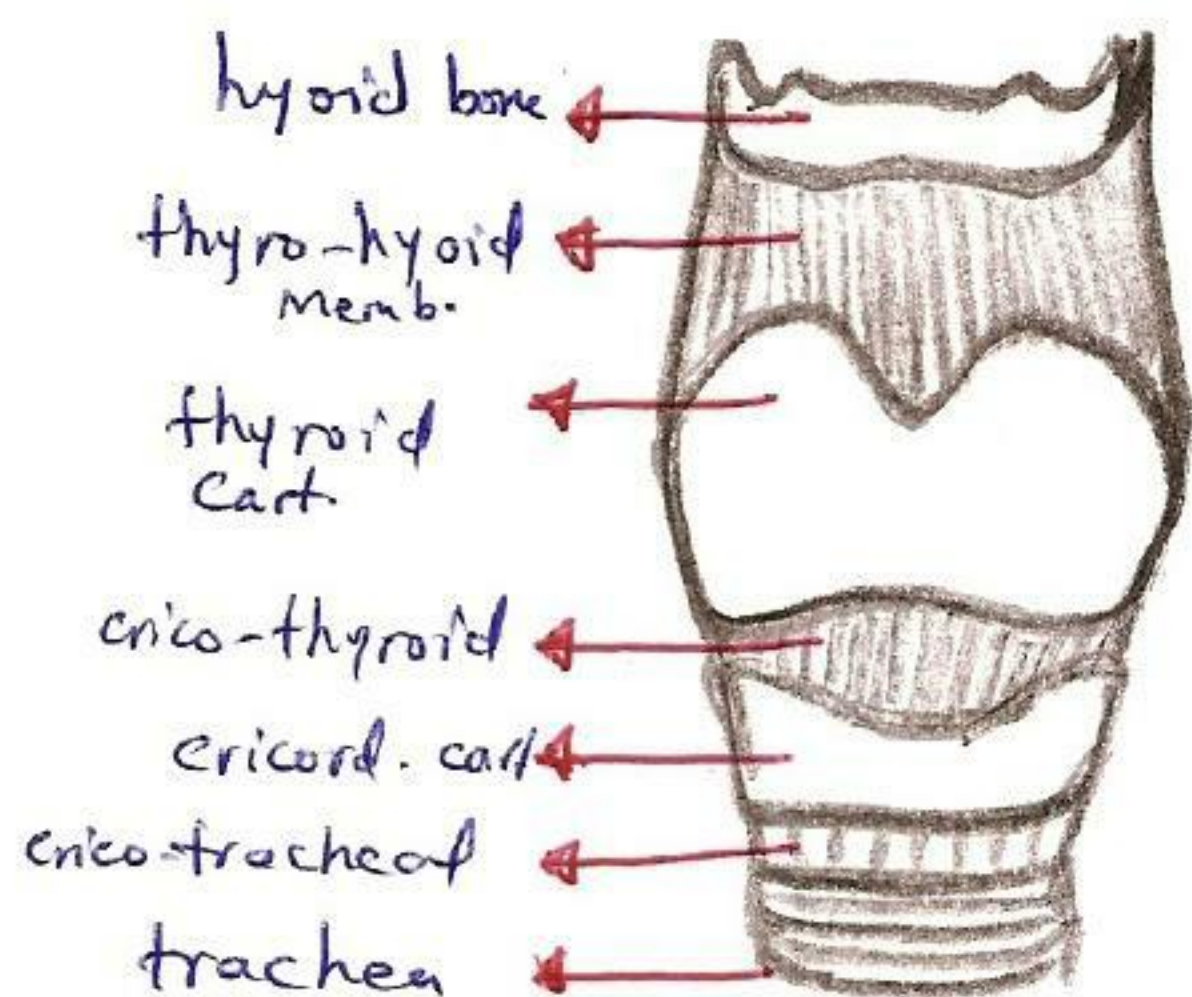
- [A] - Muscles closing laryngeal orifice:
 (transvers arytenoid & two aryo-epiglottic ms).
- [B] - Muscles stretching vocal cords:-
 (two crico-thyroids & two post. crico-arytenoids).
- [C] - Muscles relaxing vocal cords:-
 (two thyro-arytenoids).
- [D] - Muscles abducting vocal cords:-
 (two post. crico-arytenoids).
- [E] - Muscles adducting vocal cords:-
 (1 transverse arytenoid & two lat. crico-arytenoids).

NB * all ms of larynx are intrinsic (origin & insertion in larynx).
 * all ms of larynx present inside larynx (except cricothyroid lies outside).

* LARYNGEAL INLET (ORIFICE):

- anteriorly & above → epiglottis.
- each sides → aryo-epiglottic fold (contain aryo-epiglottic ms).
- inferiorly & behind → inter-arytenoid fold (contain transv. arytenoid m.)

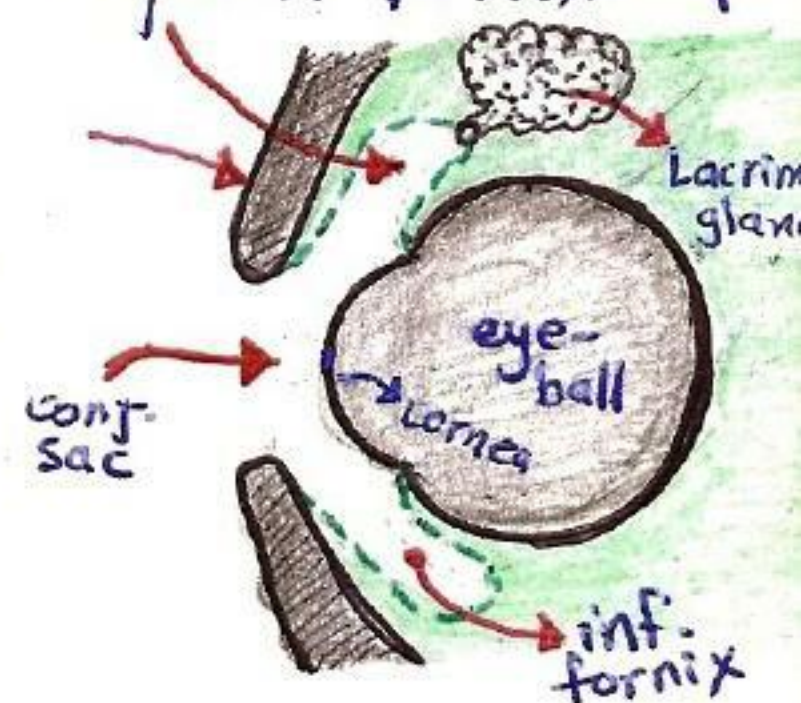
N.B. Rima glottidis → space between 2 vocal folds (narrowest part)
 Rima vestibuli → space between 2 vestibular folds.



- Best wishes -
 18.5.2007
 05:30 AM
 - Cairo -

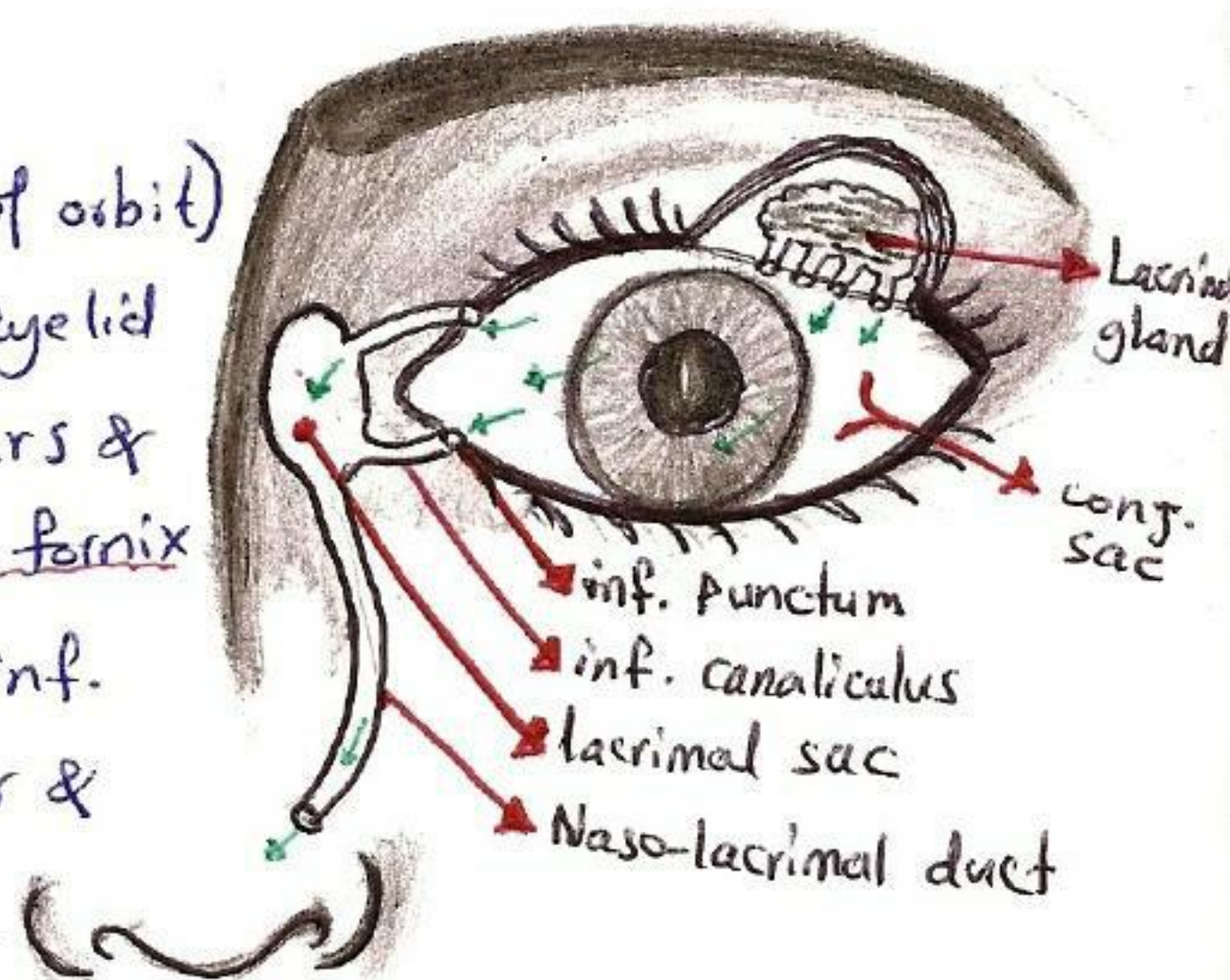
ORBITAL CAVITY

- The bony "**orbit**" is a pyramidal space with apex (at optic canal), base (at norma frontalis of skull-orbita opening) and 4 walls (med, lat, ant. & posterior).
- The "**eyelid**" covers the orbit over eyeball and leaving a fissure called "**palpebral fissure**".
- The "**conjunctiva**" is a mucous membr. lining the eyelid (post. surfaces of upper & lower eyelids) and covers the eyeball (except the cornea), the reflection of conjunctive from upper eyelid and & lower eyelid onto the eyeball called **superior fornix** & **inferior fornix** respectively.
- The sac formed after closing the eyelids is called "**conjunctival sac**".



* LACRIMAL APPARATUS:

- The Lacrimal gland has 2 parts:
 - ① - main part : in lacrimal fossa (roof of orbit)
 - ② - Palpebral " : in lat part of upper eyelid
- The lacrimal gland secretes the tears & by about 12 ducts pass into sup. fornix of conjunctival sac → into sup. & inf. puncti (opening in medial ends of upper & lower eyelid margins) → into sup. & inf. canaliculi → into lacrimal sac → into naso-lacrimal duct → into inf. meatus of nasal cavity.



CONTENTS OF ORBIT

- ① Eyeball.
- ② Lacrimal apparatus.
- ③ Ligaments, fascia & fat.
- ④ Muscles (extra & intra-ocular ms).
- ⑤ Nerves (sensory, motor & autonomic).
- ⑥ Vessels (ophthalmic a & veins).

MUSCLES OF ORBIT: ocular muscles are:

extra-ocular

- ① Levator palpebrae superioris
- ② Two oblique ms. (sup. & inf.).
- ③ Four recti ms (sup., inf., med. & lat.).

intraocular

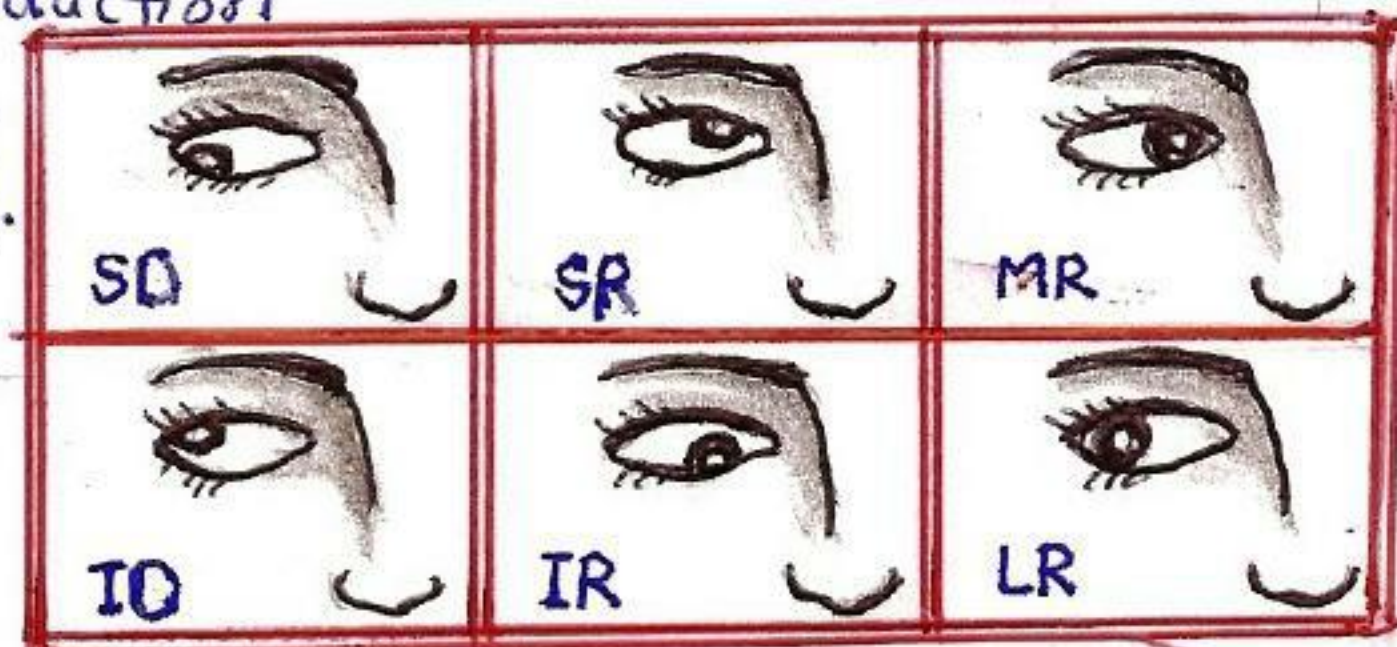
- ① Dilator papillae.
- ② Sphincter papillae.
- ③ Ciliary muscle

*NERVE SUPPLY OF MS:

- INTRAOCULAR: - Dilator papillae → by sympathetic N.
- Sphincter " & ciliary → by parasymp. (ciliary ganglion)
- EXTRA-OCULAR: - all supplied by oculomotor (3) except
 - superior oblique → by trochlear (4) {SO₄}
 - Lateral rectus (LR) → by abducent (6) {LR₆}

*ACTION OF MS:

- Levator palpebrae superioris → elevation of upper eye lid.
- Superior oblique (SO) → depression & abduction of eyeball. (looking to shoulder)
- inf. oblique (IO) → elevation & abduction
- Sup. rectus (SR) → elevation & add.
- inf. rectus (IR) → depression & add.
- Med. rectus (MR) → adduction.
- Lat rectus (LR) → abduction.



*ORIGIN & INSERTION:

- The 4 recti origin from tendinous ring (around optic foramen) & inserted into eyeball (according to name) → in front equator خط الاستواء
- Sup. oblique from roof & inf oblique from floor of orbit & inserted into eyeball (according to name) → behind equator.

NERVES OF ORBIT:

- [A] SENSORY :** - General sensory $\rightarrow$ ophthalmic n. (by Lacrimal, Frontal, Nasociliary)
Special sensory $\rightarrow$ optic n. (vision).

- BL MOTOR** :- All ms. by oculomotor [3] (except LR6 & SO4)

- ☐ AUTONOMIC: by sympathetic, parasympathetic & ciliary ganglion.

N.B. SR $\xrightarrow{\text{by}}$ ③ (sup. division of oculomotor)
IR } $\xrightarrow{\text{by}}$ ③ (inf. " " " ")
MR }

VESSELS OF ORBIT:

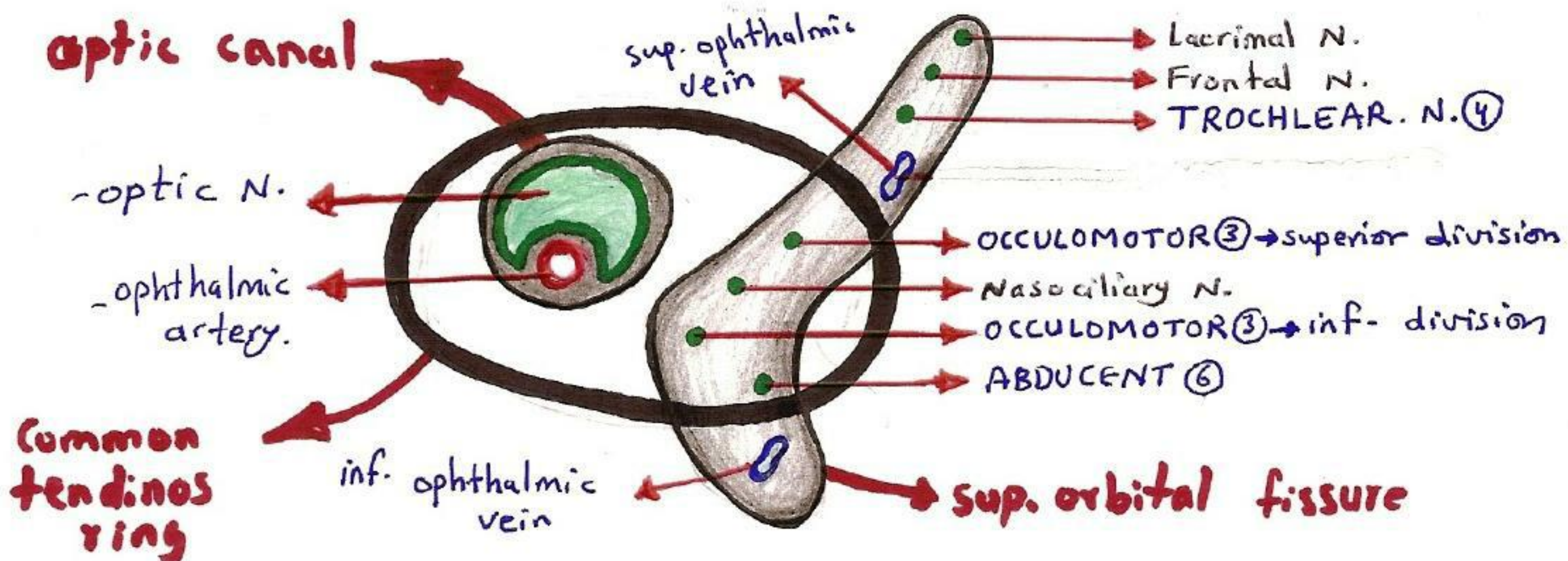
[A] OPHTHALMIC ARTERY :

- origin from ICA (intracranial part)
- End by giving 2 terminal br. (supratrochlear & dorsal nasal).
- Course: enters optic foramen below then lat then above & finally medial to optic nerve.

- Branches :-
- ① Central a. of retina.
 - ② Lacrimal a.
 - ③ Palpebral & muscular.
 - ④ Dorsal nasal (terminal)
 - ⑤ supra-trochlear ^{terminal}
 - ⑥ supra orbital.
 - ⑦ ant. & post. ethmoidal
 - ⑧ ant. & post. ciliary.

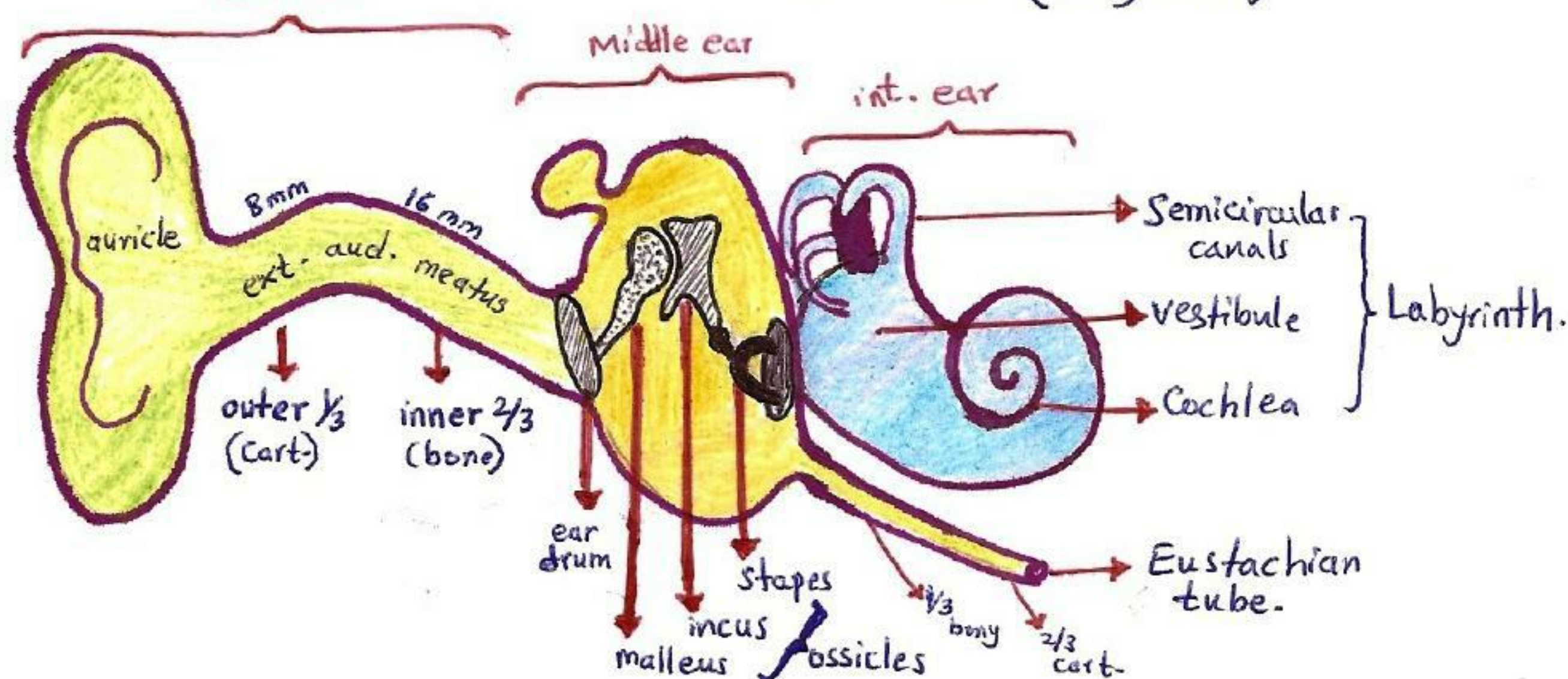
[B] OPHTHALMIC VEINS :

- The two ophthalmic veins formed in the orbit & drains into Cavernous sinus (sometimes inf. vein opens into sup. ophth. vein).
- Both veins emerge from sup. orbital fissure.
- sup. ophth. vein communicates with ant. facial vein. while inf. " " " " pterygoid plexus.



THE EAR

- The ear consists of
- external ear.
 - Middle ear. (tympanic cavity) -
 - internal ear. (Labyrinth).



EXTERNAL EAR:

①*The auricle: - formed of elastic cartilage (except lobule has no cart.)

- It collects the sounds.

- It is supplied by - auriculotemporal n. (upper 1/2 outer surface)
 - Lesser occipital n. (" " inner ")
 - Great auricular n. (lower 1/2 both sides).

②*The External auditory meatus: it is about 24 mm

- Its outer 1/3 is cartilaginous & directed upward & backwards

- Its inner 2/3 is bony (16 mm) & directed downward & forwards.

③*The ear drum: (tympanic membr.)

* It separates middle ear from ext. auditory meatus, about 10 mm x 8 mm

* It's oblique [facing laterally, downward & forward]

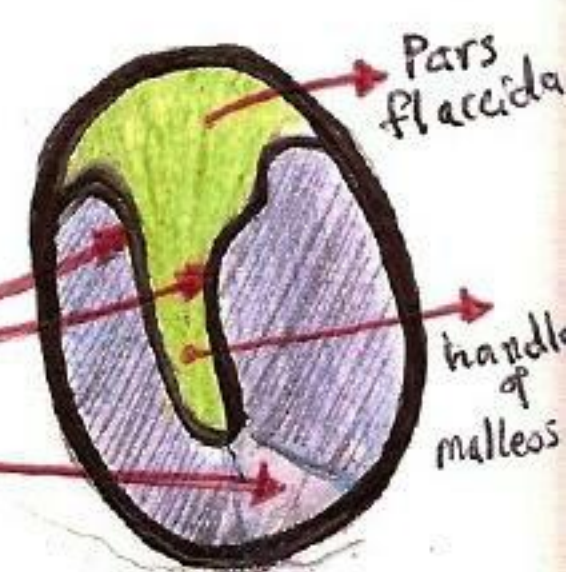
* It consists of Pars flaccida & Pars tensa, they are separated by 2 fold (ant & post. malleolar folds)

- the antero-inferior quadrant of drum called cone of light because it reflects light of examiner's torch.

* The drum wall is formed of

- outer layer → skin (ectoderm)
- Middle → fibrous tissue (meso) [absent in Pars flaccida]
- inner → mucous memb. (endo).

* N/s → outer surface by auriculotemp. - inner by tympanic plexus (glossopharyngeal n.)



MIDDLE EAR: (tympanic cavity): consists of:

- A** 3 ossicles
- Malleus
 - head
 - handle
 - incus
 - body
 - Short & long process
 - Stapes
 - ant. & post. crura
 - head & neck
 - foot of stapes
- B** 2 muscles
- stapedius (N/s - n. to stapedius - facial)
 - Tensor tympani (n. to med. pterygoid - mandibular n.)
- C** 2 nerves
- chorda tympani → from facial
 - tympanic plexus (formed by tympanic br. of glossopharyngeal n. and symp. n. from plexus around ICA)
- D** air inside the cavity.
-
- Diagram illustrating the middle ear cavity and its components:
- handle
 - ear drum
 - head
 - body
 - short process
 - ant. crus
 - neck
 - foot
 - tensor tympani
 - pyramidal

[NB] The tensor tympani & stapedius ms. acting as damping down the intensity of high pitched sounds by preventing excessive movement of drum & stapes respectively.

Q8 The Eustachian tube (pharyngo-tympanic tube) is 36 mm long consist of $\frac{1}{3}$ bony part (12 mm) & $\frac{2}{3}$ cartil. part (24 mm).
- it connects nasopharynx with tympanic cavity (ant. wall).

- * The middle ear lies inside petrous part of temporal bone.
- * It is a biconcave box consists of roof, floor & 4 walls (ant. post - Med. lat)

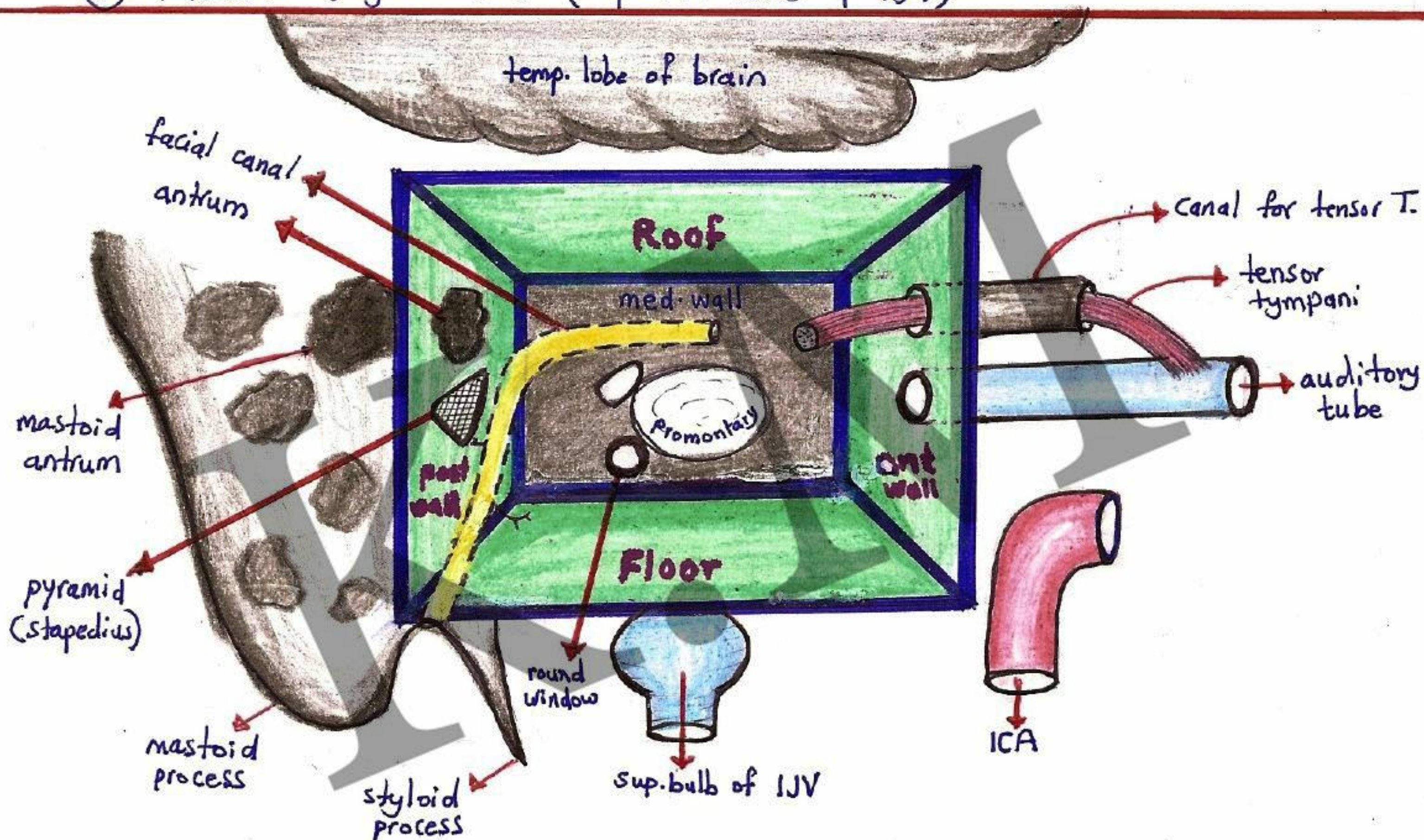
* RELATION OF MIDDLE EAR :

- ① Roof :- temporal lobe of brain (in middle cranial fossa).
- ② Lateral :- ear drum.
- ③ Medial :- Promontory (elevation of cochlea)
 - oval window (above & behind promontory) - closed by foot of stapes.
 - Round window (below & " " " ") - " " 2nd tympanic membrane
 - horizontal part of facial canal (formed by facial n.)
- ④ Posterior :-
 - Vertical part " " " " " "
 - Pyramid (process contains stapedius)
 - aditus (opening into mastoid antrum).

} from below upward

- ⑤- Anterior wall: - opening for tensor tympani canal } from above
 - " " Eustachian tube } downward.
 - Carotid canal (ICA).

- ⑥- Floor:- Jugular fossa (superior bulb of IJV)



INNER EAR : (Labyrinth)

• It lies inside petrous part of temporal bone & consists of:

- ① Bony labyrinth :- consist of - Semicircular canals, vestibule & cochlea.
- ② Membranous " :- " " - Semicircular ducts, utricle and sacculle & cochlear duct

[NB] - the semicircular canals are (superior, post. & lateral).

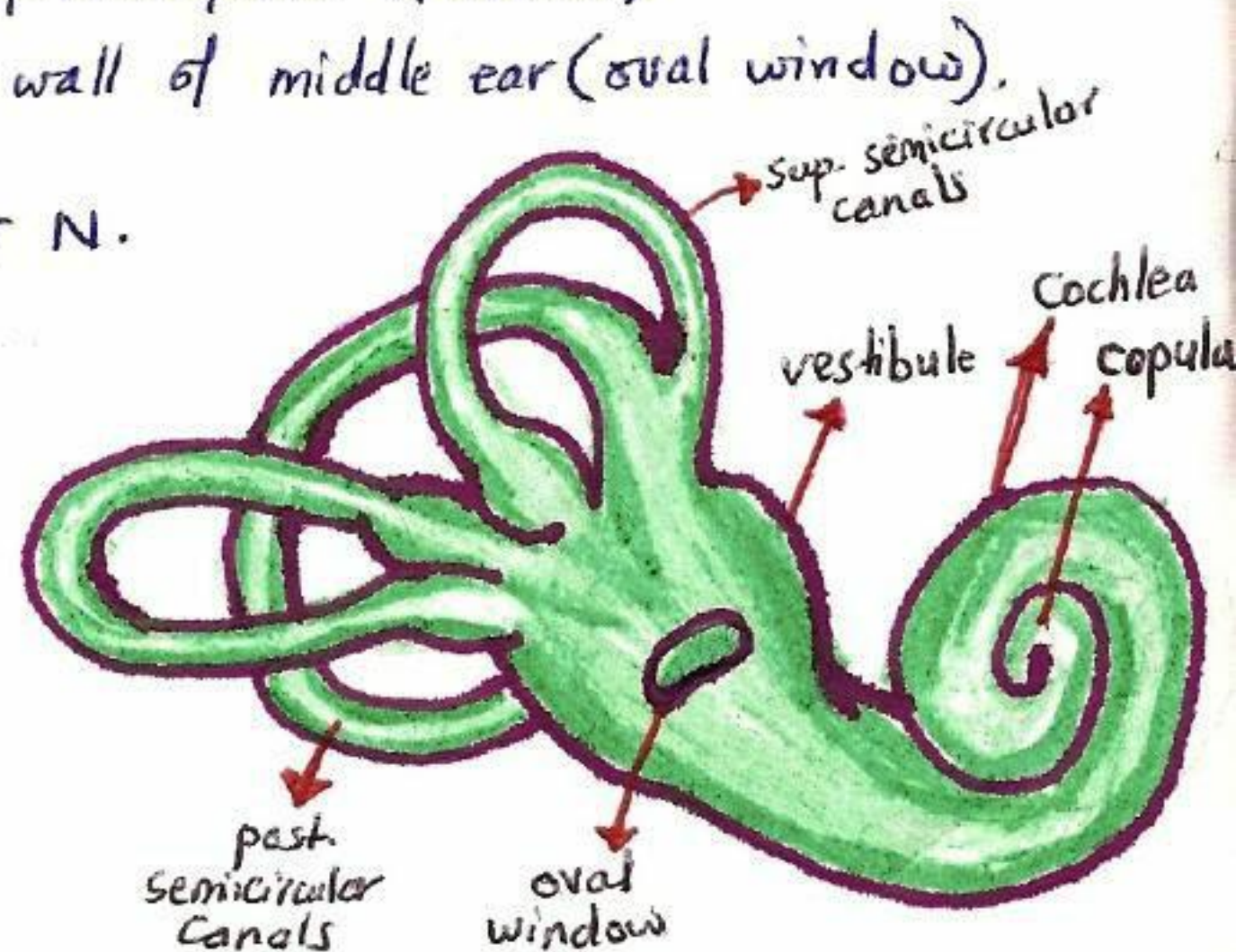
[NB] - the vestibule related to medial wall of middle ear (oval window).

* Nerve supply of labyrinth - vestibulo-cochlear N.

* Blood supply of labyrinth - by

- ① labyrinthine br. of basilar a.
- ② stylomastoid br. of post. auricular a.

• Venous drain into sup. petrosal sinus or transverse sinus.



SYMBATHETIC CHAIN IN NECK

- It is continuous below with thoracic chain.
- It has 3 ganglion (sup., middle & inf. cervical ganglion).
- It is related • anteriorly to: ICA (above) & CCA (below) → embedded in post. wall of carotid sheath
• posteriorly to: longus collis & longus capitis ms.

	Sup. cervical symp. gang.	Middle cervical gang.	inf. cervical ganglion
size	- Largest (2-3 cm long)	- Smallest	- medium sized.
position	= opposite C ₂ -C ₃ vertebrae	= opposite C ₆ vertebra	bet. transv. process of C ₇ & neck of 1 st rib.
Branches	① Communicating br. to last 4 cranial nerves ② Gray rami communicate to upper 4 cervical n. ③ Cardiac br.: to deep cardiac plexus (Rt side) & superf. " plexus (Lt side) ④ int. Carotid n. → around ICA. ⑤ Ext. " " → " ECA ⑥ Pharyngeal br → to phary. plexus	① gray rami communicates to C ₅ -C ₆ ② Cardiac br. → to deep cardiac plexus ③ ansa subclavia: → br. joins inf. cervical ganglion after forming loop around 1 st part of subclavian artery. ④ thyroid br. → around inf. thyroid artery.	① gray rami communicates to C ₇ -C ₈ ② Cardiac br. → to deep cardiac plexus ③ subclavian br. → around subclavian artery. ④ Vertebral br. → around vertebral artery

N.B: The inf. cervical symp. ganglion may fuse with the 1st thoracic gang. to form cervico-thoracic (stellate) ganglion.

N.B: The petrosal Nerves are autonomic nerves related to petrous part of temporal bone

- ① Deep petrosal n. (symp.) [br. of symp. plexus around ICA]
 - ② Greater superf. petrosal n. (parasy.) [br. of facial n.]
 - ③ Lesser superf. petrosal n. (symp.) [br. of tympanic plexus (9)]
- ① & ② → Joined after passing F. lacertum → forming **Vidian N.** (N. to pterygoid canal) → to pterygo-palatine ganglion
 ③ → passing through F. ovale → to otic ganglion

نعم محمد الله
أعف الظائر للجميع
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CLINICAL NOTES ON HEAD & NECK

(أسنان)

"Applied anatomy"

[A] SCALP :

1- Scalp laceration :-

- Scalp laceration bleed profusely (rich blood supply) & usually arterial bleeding (as venous pressure at erect position is low) where arterial lumen kept open by dense ^{fibrous} c.T surrounding B.V.

2- Scalp infection:-

- usually ^{very} painful & little swelling (because of thick c.T ^{under skin})
- occasionally, spread by emissary veins (valveless) to skull bones (causing osteomyelitis) and venous sinuses (causing venous thrombosis).

3- Skin lesions :-

- skin of scalp is common site for sebaceous cysts & seborrhoea & if injured bleed profusely.

4- aponeurosis damage (epicranial):-

- transverse wounds of the scalp ^{will} gap open if the aponeurosis cut so better to ~~do~~ do stitching.

5- Black eye:-

- Blood or pus from injury to scalp or forehead enters the eyelids & nose (as frontalis inserted into skin not bone)

6- pericranium damage-

- injury of pericranium (under it) takes the shape of bone if fluid collected under it.

[B] FACE :

- 1 - Facial injury bleed profusely, but heal quickly because of rich blood supply & ^{arterial} anastomosis.
- 2 - As lateral pterygoid muscle is ~~is~~ attached to disc of TMJ, so during yawning (or taking large ^{of food} bite) excessive contraction of lat. pterygoids → dislocation of condyle of mandible → patient cannot close the mouth without manual distraction.
- 3 - Paralysis of muscle of mastication → deviation of jaw to paralysed side (being pushed by normal lateral pterygoid muscle of opposite side).
- 4 - **Mumps**:- is a viral infection mainly in parotid gland.
- 5 - Lingual nerve is related to the 3rd molar where it can be damaged by a clumsy extraction of an impacted last molar tooth.
- 6 - Parotid gland surgery is usually involving superficial part to avoid facial nerve injury
- 7 - swelling of parotid gland is usually Painfull as the covering parotid fascia is very thick.

Anterior cranial fossa

Opening in skull	Bone of skull	Structures transmitted
Perforations in skull	Ethmoid	Olfactory nerves

Middle cranial fossa

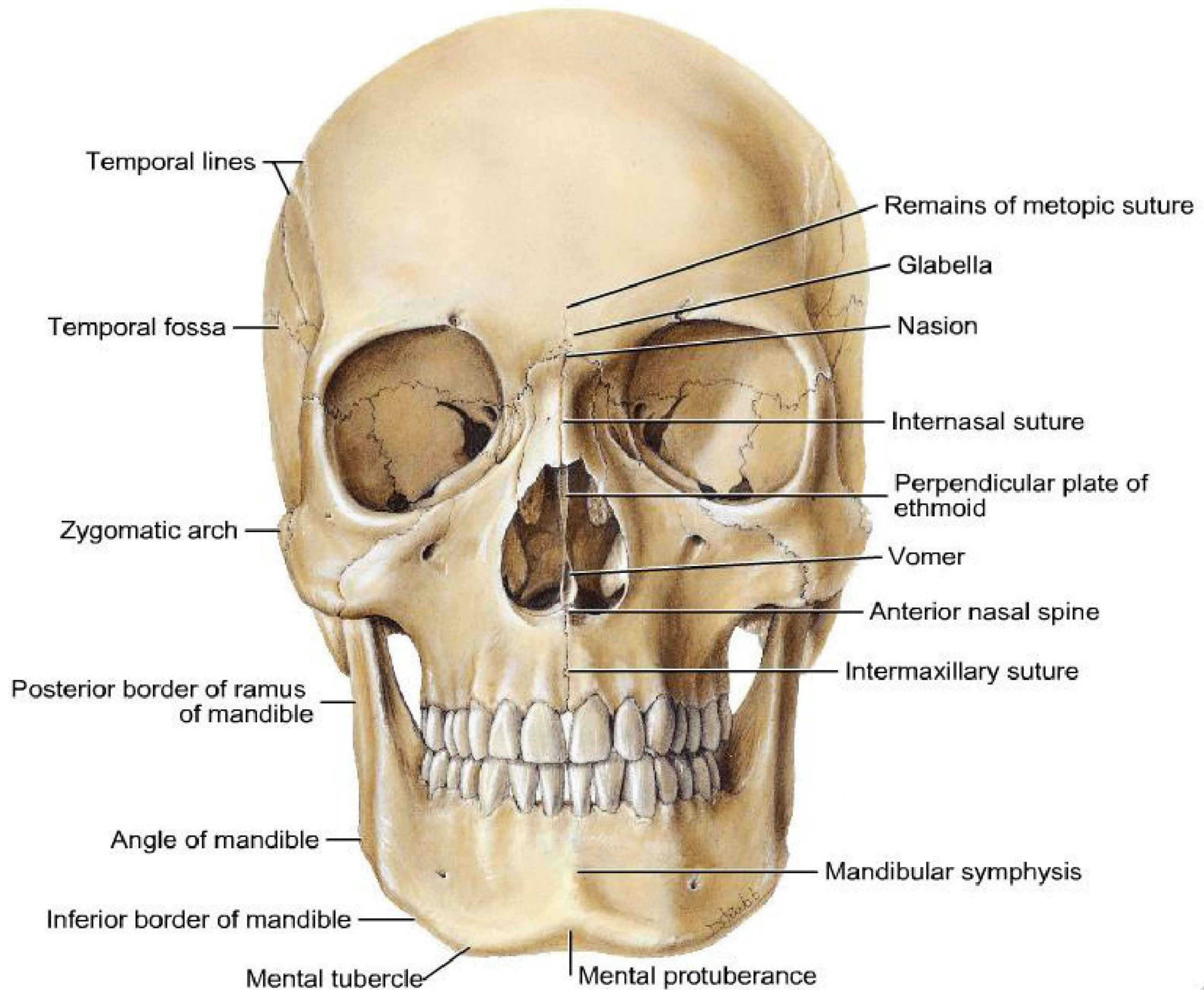
Opening in skull	Bone of skull	Structures transmitted
Optic canal	Lesser wing of sphenoid	Optic nerve Ophthalmic artery
Superior orbital fissure	Between lesser and greater wings of sphenoid	1. <u>Live</u>: Lacrimal nerve (ophthalmic nerve) 2. <u>Free</u>: Frontal nerve (ophthalmic nerve) 3. <u>To</u>: Trochlear nerve 4. <u>See</u>: Superior division of oculomotor nerve 5. <u>No</u>: Nasociliary nerve (ophthalmic nerve) 6. <u>Insult</u>: Inferior division of oculomotor nerve 7. <u>At</u>: Abducent nerve 8. <u>Oil</u>: Ophthalmic veins (superior $\pm$ inferior)
Foramen rotundum	Greater wing of sphenoid	Maxillary nerve
Foramen ovale	Greater wing of sphenoid	1. Mandibular nerve 2. Lesser petrosal nerve 3. Accessory meningeal artery 4. Middle meningeal vein 5. Emissary vein
Foramen spinosum	Greater wing of sphenoid	1. Middle meningeal artery 2. Nervous spinosus (meningeal nerve of mandibular nerve) 3. Emissary vein
Foramen lacerum	Between petrous part of temporal and sphenoid	• Greater petrosal nerve • Emissary vein • Internal carotid artery (In upper part of the foramen)
Emissary sphenoidal foramen	Greater wing of sphenoid	• Emissary vein
Carotid canal	Side of foramen lacerum, petrous part of temporal bone	1. Internal carotid artery 2. Internal carotid sympathetic plexus 3. Emissary vein

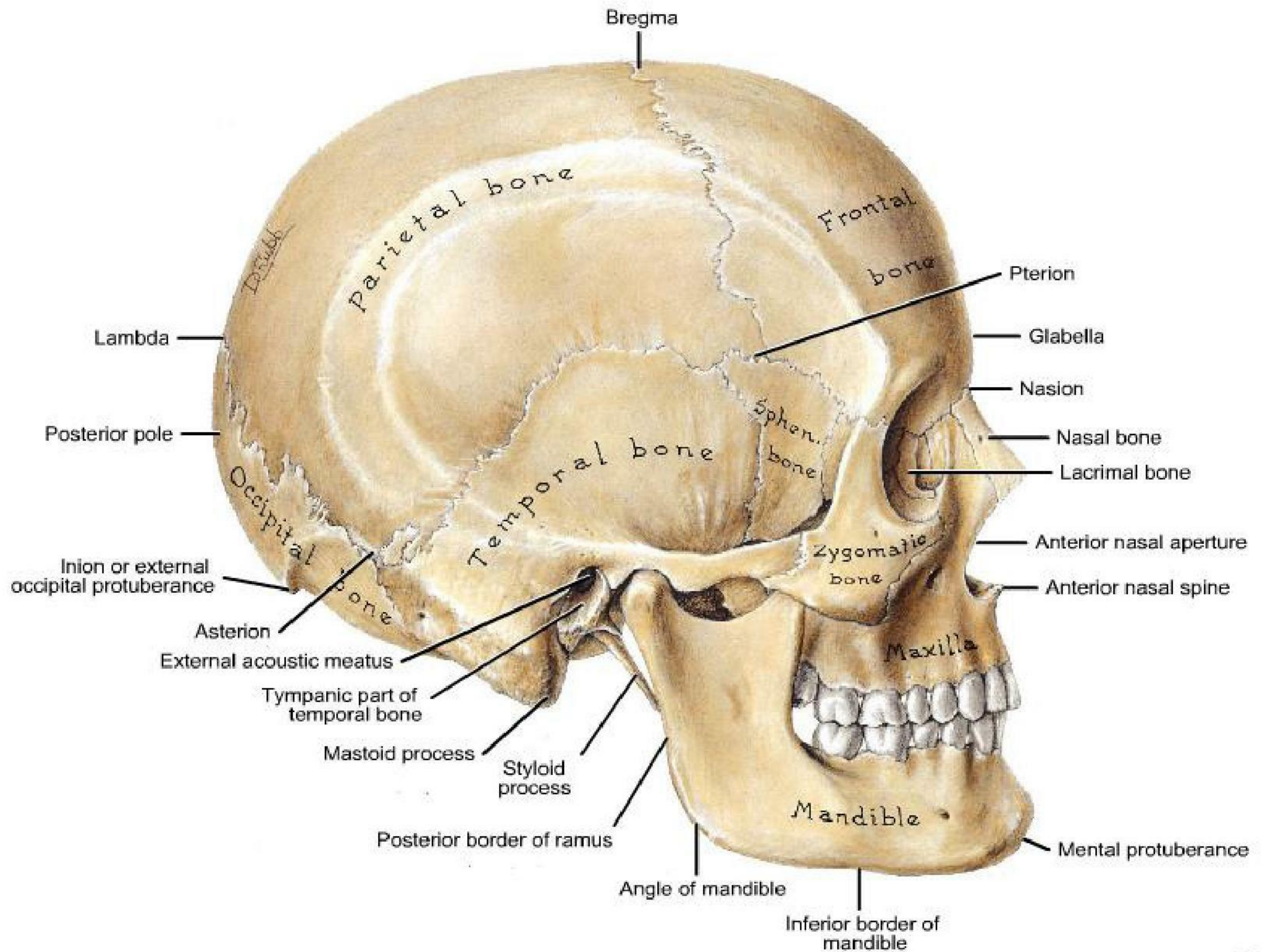
Posterior cranial fossa

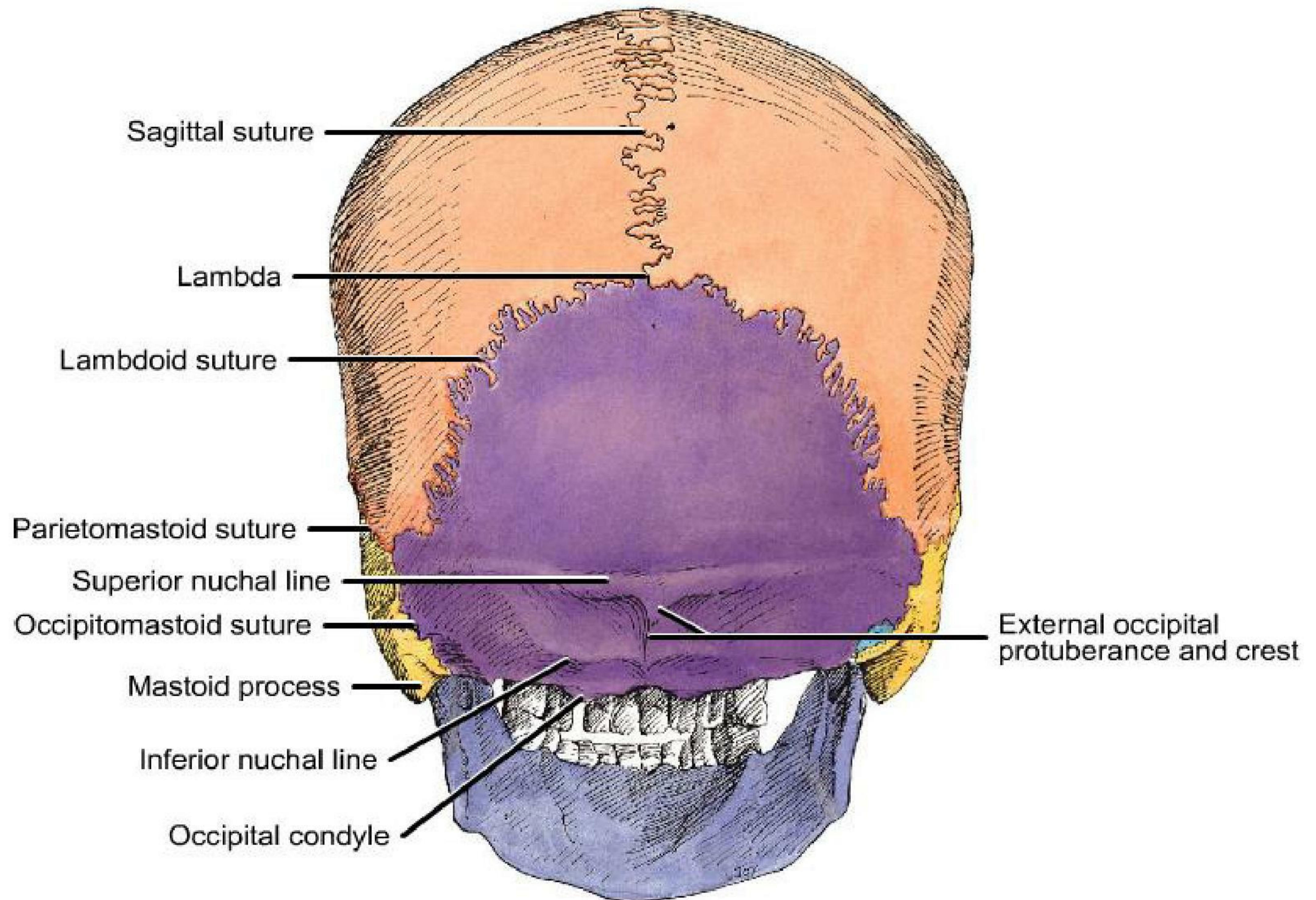
Opening in skull	Bone of skull	Structures transmitted
Foramen magnum	Occipital	1. Medulla oblongata 2. Tonsils of cerebellum 3. Pia mater 4. Cerebrospinal fluid 5. Arachnoid mater 6. Dura mater 7. Spinal part of accessory nerves (right & left) 8. Vertebral arteries (right & left) 9. Anterior spinal artery 10. Posterior spinal arteries (right & left) 11. Internal vertebral venous plexus 12. Apical ligament 13. Superior band of cruciate ligament 14. Membrana tectoria
Hypoglossal canal	Occipital	1. Hypoglossal nerve 2. Meningeal branch of hypoglossal nerve 3. Emissary vein
Jugular foramen	Between petrous part of temporal and condylar part of occipital	1. Inferior petrosal sinus 2. Glossopharyngeal nerve 3. Vagus nerve 4. Accessory nerve 5. Meningeal branch of glossopharyngeal nerve 6. Meningeal branch of vagus nerve 7. Sigmoid sinus 8. Emissary vein
Internal acoustic meatus	Petrous part of temporal	1. Facial nerve 2. Vestibulocochlear nerve 3. Labyrinthine vessels
Condylar canal	Occipital	Emissary vein

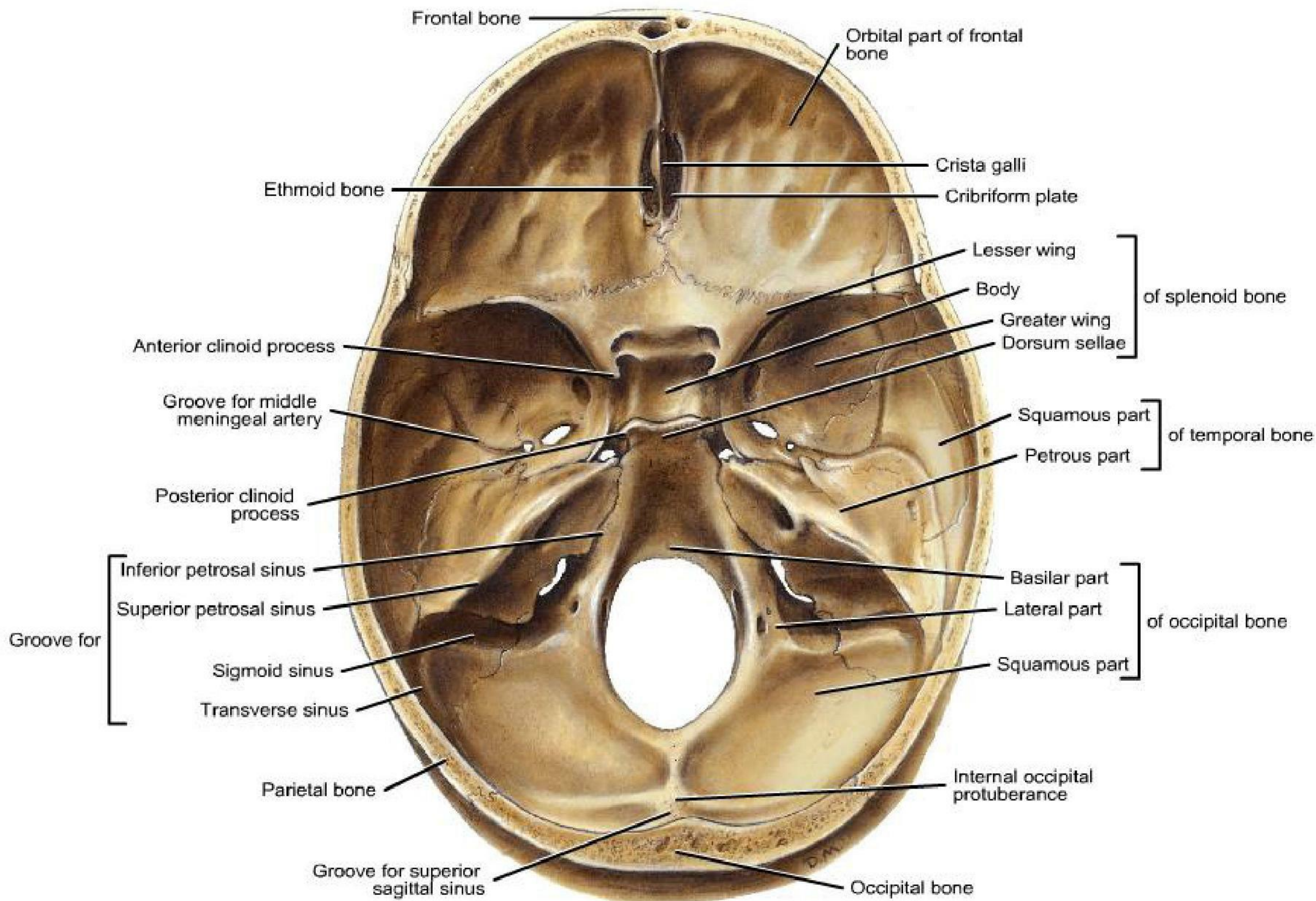
OPENINGS INTO ORBITAL CAVITY

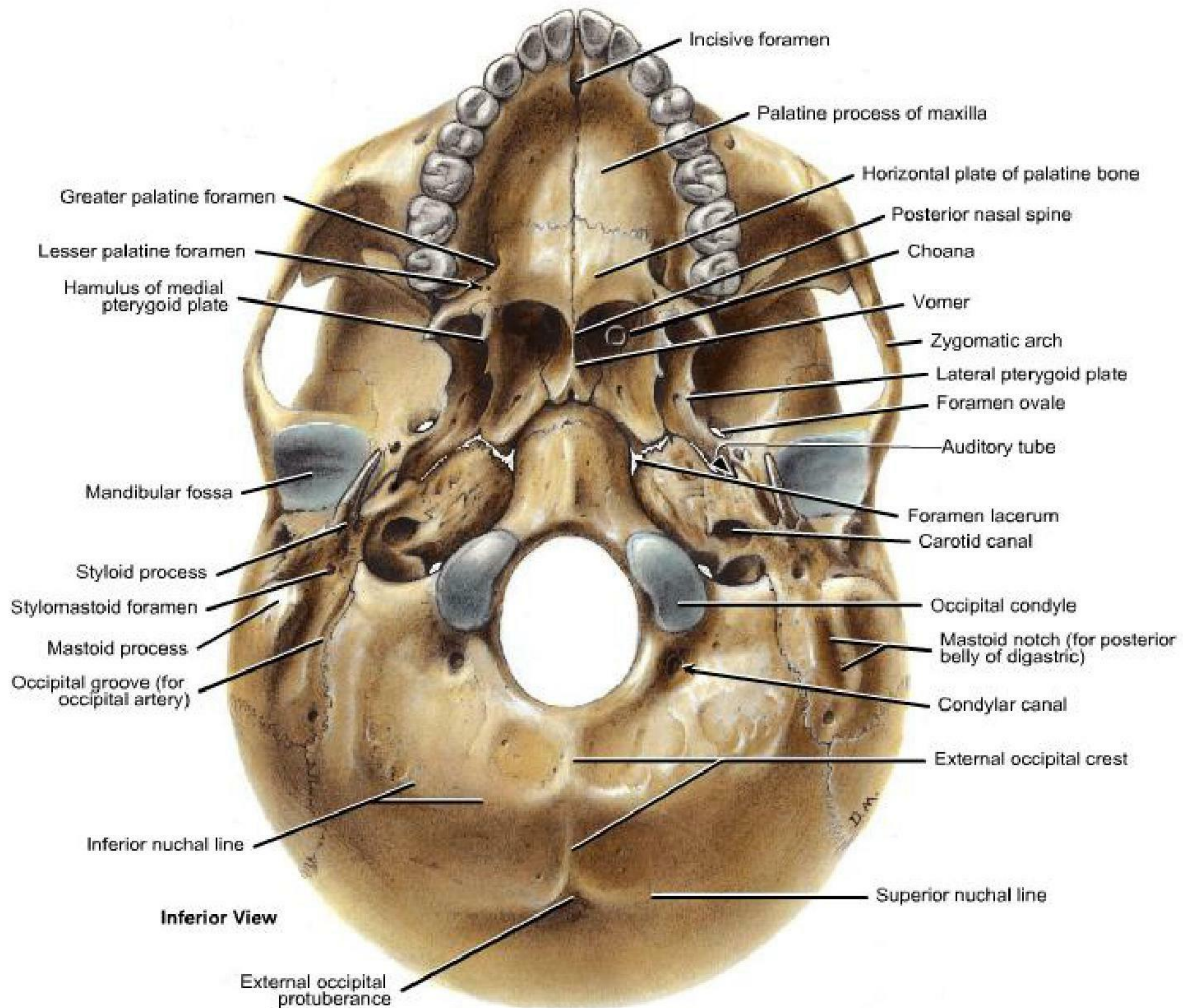
Opening in skull	Bone of skull	Structures transmitted
Optic canal	Lesser wing of sphenoid	1. Optic nerve 2. Ophthalmic artery
Superior orbital fissure	Between lesser and greater wings of sphenoid	1. <u>Live</u> : Lacrimal nerve (ophthalmic nerve) 2. <u>Free</u> : Frontal nerve (ophthalmic nerve) 3. <u>To</u> : Trochlear nerve 4. <u>See</u> : Superior division of oculomotor nerve 5. <u>No</u> : Nasociliary nerve (ophthalmic nerve) 6. <u>Insult</u> : Inferior division of oculomotor nerve 7. <u>At</u> : Abducent nerve 8. <u>Oil</u> : Ophthalmic veins (superior $\pm$ inferior)
Supraorbital notch (foramen)	Orbital plate of frontal bone	1. Supraorbital nerve 2. Supraorbital vessels
Infraorbital groove and canal	Orbital plate of maxilla	1. Infraorbital nerve 2. Infraorbital vessels
Nasolacrimal duct	Medial wall of orbit, communicates with inf. meatus of nose	• Nasolacrimal duct
Inferior orbital fissure	Between maxilla and greater wing of sphenoid	1. Maxillary nerve 2. Zygomatic branch of maxillary nerve 3. Inferior ophthalmic (emissary) vein 4. Sympathetic nerves
Zygomaticotemporal foramen	Lateral wall of orbit, Zygomatic	1. Zygomaticotemporal nerve 2. Zygomaticotemporal vessels
Zygomaticofacial foramen	Lateral wall of orbit, Zygomatic	1. Zygomaticofacial nerve 2. Zygomaticofacial vessels
Anterior ethmoidal foramen	Medial wall of orbit, ethmoid	1. Anterior ethmoidal nerve 2. Anterior ethmoidal vessels
Posterior ethmoidal foramen	Medial wall of orbit, ethmoid	1. Posterior ethmoidal nerve 2. Posterior ethmoidal vessels

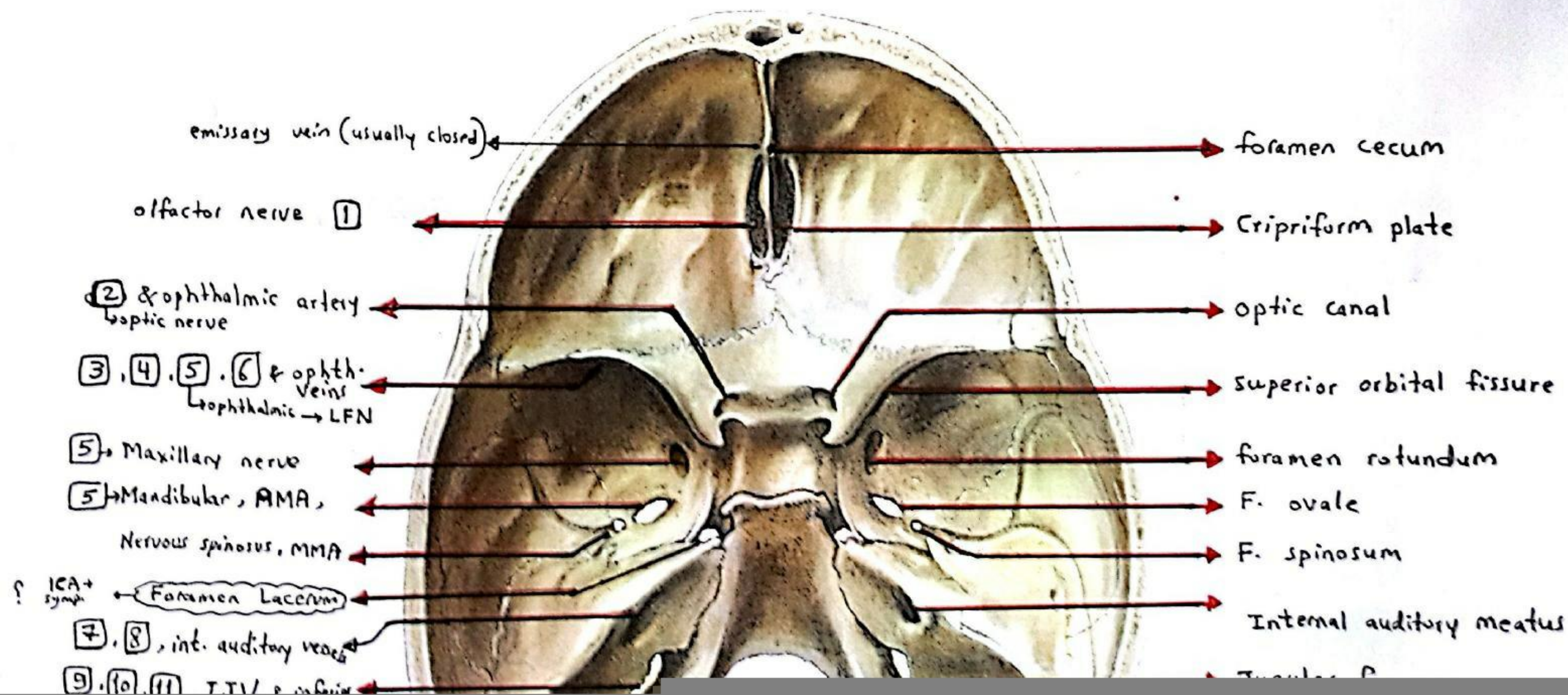


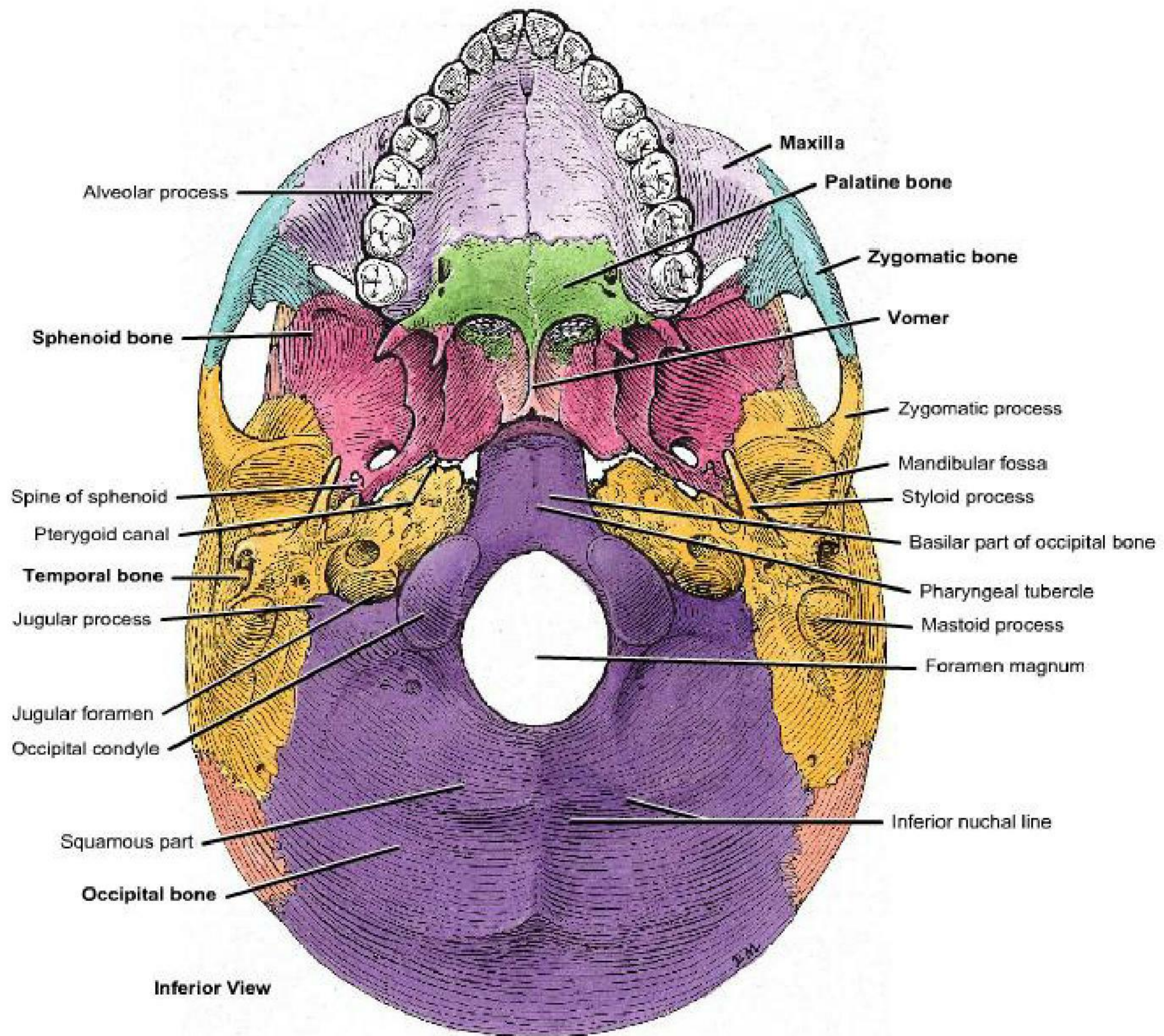












Pharynx

Sagittal Section

